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A NEW SPECIES OF *DICERANDRA* (LAMIACEAE) FROM FLORIDA

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ABSTRACT

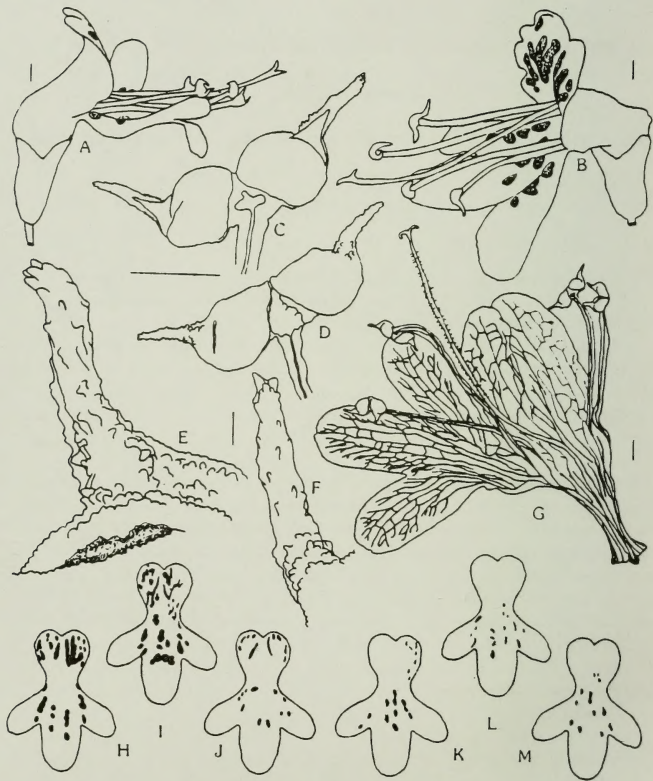
A new species of *Dicerandra*, *D. thinicola* H.A. Miller is described from Florida. It resembles *D. immaculata* but differs in having an abundantly maculate corolla, anther appendages shorter than the length of the theca, the horn of the appendage coarsely conic-tuberculate at the base and with scattered prorate teeth distally.

KEY WORDS: Lamiaceae, *Dicerandra*, Florida

For several years graduate level classes in the plant biosystematics course at the University of Central Florida have been studying a nearby population of a suffrutescent *Dicerandra*. The plant is different from the only known woody Atlantic coastal species, *D. immaculata* Lakela, which lacks spots on the corolla (Wunderlin 1982). It differs from the Lake Wales ridge species, *D. frutescens* Shinnery and *D. christmanii* Huck & Judd which are white with spots and the Ocala ridge species, *D. cornutissima* Huck, which has a glabrous to scarcely hairy style and horns which exceed the length of the anther sac. These and other characteristics combine to make it clear that the following species has remained undescribed:

***Dicerandra thinicola* H.A. Miller, sp. nov.** Figure 1. Specimen typicum: UNITED STATES. Florida: Brevard County, at the end of Brandt Road, south of Columbia Avenue (SR 405), 5 November 1987, *Steven Reifler 1* (HOLOTYPE: MU; Isotypes: USF, FTU).

Plantae perennis, suffruticosa, usque ad 0.7 m alta sed saepe brevior. Rami ascendentes, angulosi apicem versus, foliis oppositis,



Dicerandra thinicola H. A. Miller. A, B. Flowers; C, D. Anthers; E, F. Anther appendages outside the stomium; G. Corolla split to show insertion of stamens and shape of the style; H-M. Diagrams of some spot patterns as seen front view of the corolla. Scale bars: A, B, C, D, G = 1mm; E, F = 0.1 mm.

linearibus, patentibus et aromaticis, marginibus integris. Verticillastri nunc multiflori axillares vel nunc omnes pauciflori. Flores in cyma, pedicelli brevibus, ca. 3 mm longis. Calyx cylindraceus, erectus, ore obliquo bilabiato, labio postico bidentato, labio antico integro et longitudinaliter bialato, intus glaber praeter circulo pilorum erectorum infra ore. Corolla bilabiata tubo basi geniculato (plerumque 60-75°), coloribus subroseis vel purpureis et maculis semper atropurpureis, labio postico trilobato, labio antico emarginato. Stamina exserta et tubo corollae supra basin sed infra medium inserta; filamenta graciles, antherarum thecae glabrae, divaricatae cum uterque theca in cornu attenuatum, theca e basi cornus dehiscens. Pistillum ovario 4-lobato in gynophoro orculiformi inserto, stylo gracili pili patentibus conspicuis, stigma terminate breve bilobum.

Subshrub 0.4-0.9 m high with ascending branches originating from a short trunk up to ca. 15 cm high, each spreading primary branch again branching near the base with nearly erect leafy branches, all of about equal length. Leaves opposite, oblong-linear, entire, acute, glabrous but glandular dotted on both surfaces, 14 (10-19) mm long \times 1.3 (1.0-2.1) mm wide. When flowering is initiated shortly after the autumnal equinox, the oldest leafy branches begin to elongate distally to form an herbaceous verticillaster. When the inflorescence matures, new vegetative branches form in the middle of the plant even before the sexual cycle is completed on the fructiferous branches which die back once the fruits are mature. The verticillaster is comprised of 12 (5-16) floriferous nodes with an internodal distance of 15 (9-26) mm, bracts mostly 0.8-1.3 mm. The peduncle at the base of each 3-5(-7) flowered dichasium is 1.2 (0.9-1.7) mm long, pedicel 3 (1.5-4.2) mm long and scabrous. Calyx urceolate, bilabiate, weakly winged above, mostly smooth with a few short, stiff, antrorse hairs on the ribs, free margins ciliate, the inner calyx surface with a band of stiff antrorse hairs about 2/3 above the base and 6.5 (6-8) mm long \times 2 mm wide. Corolla bilabiate, the erect standard erect with a shallow distal notch and variously splotched with dark pigments in the general orientation of nectar guides; the lower lip distinctly 3-parted with irregular rows of dots or streaks oriented towards the tube; corolla tube 5 (4.5-6.5) mm long up to the geniculum above which the infundibulum is 9.5 (9-12) mm at its greatest length on the lower lip, neck of the corolla tube lined with glandular hairs. Corolla colors: background; white (2.5 RP9.5/1), purplish white (2.5RP9.5/1, 4.9P8.7/1.4), very pale purple (7.5P8/4), light purple (5.4P7.3/6, 7.5P7/6), brilliant purple (7.5P3/6, 7.5P6.2/12.3), vivid purple (5RP4/12), vivid reddish purple 2.5RP5/13), deep reddish purple (2RP2.3/10.3), strong reddish purple (2.5RP5/13, 10P512), pale purplish pink (10P8.6/2) moderate purplish pink (2.5RP7/6), deep purplish pink (10P6/10); splotches; moder-

ate red (2.5R4/10), moderate reddish purple (10P4/6, 10P4/8), vivid reddish purple (4.7P4.7/15), deep reddish purple (2RP2.3/10.3), very dark purple (8.1P1.6/6), strong purplish red (5RP4/12). Stamens four, exserted, each filament arising from the base of the infundibulum and terminating in a malleolate connective separating the anther sacs; each anther sac dehiscent by a slit and bearing a slender horn shaped appendage 0.9 (0.6-1.3) mm long, the basal cells of the appendage each erect conic tuberculate, the distal cells elongate and smooth or sometimes prorate forming low teeth, and with an erose appendage tip. Anther colors: light purple (5.4P7.3/6.4, 8.75P6/7), moderate purple (7.5P5/6), dark purple (7.5P3/6), vivid purple (4.9P5/14.1, 6.2P4.7/16/3), moderate red (2.5R5/8), deep violet (9.6PB2.2/8), grayish purple (7.5P4/4), moderate purplish pink (2.5RP7/6), strong purplish pink (2.5RP7/10), deep purplish pink (10P6/10), and a range from light through strong reddish purple (10P6/9, 2.5RP6/8, 2.5RP4/6, 10P3/6, 10P3/8, 10P5/12). Pistil with slender style hispid from the geniculum to 1 mm below the stigma, 20 (18-28) mm long stigma bipartite; ovary 4-segmented, inserted on a barrel-shaped gynophore ca. 0.5 mm long \times 0.5 mm in diameter.

Additional specimens examined: UNITED STATES. Florida: Brevard County: east side of U.S. 1 A little south of Volusia County line across from church. 28 October 1988, *Johnson, A.N.* (USF); Brevard County along E side of street 0.5 mi S of Cheney Road, ca. 1.5 mi S of Indian River City, ca. 4 mi S of Titusville, sand pine scrub on low hills, 17 November 1987, *Hansen et al.* 11700 (U, FMU).

The species name, "dune dweller," for the dune scrub balm reflects the habitat of disturbed, open areas on old dunes of yellow sand.

Color names are based on the ISCC-NBS system (Kelly & Judd 1976) and the color matches were taken with the Munsell Color Cascade and the Munsell Book of Color (1976) with notations based on that system. Only representative notations are given to demonstrate the variations in the population.

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I thank a former student, Steven Reifler, for bringing the plant to my attention and providing the first collections. I thank Dr. Richard Wunderlin for his review of the manuscript; and Dr. Henry O. Whittier for his review as well as his stewardship of successful transplants to the UCF Arboretum. Students who assisted in the study of the population and who provided hundreds of measurements, color readings, and other observations are hereby thanked and recognized for their participation as follows: Siri Anderson, Gary Barnett, Juanita Villalobos-Bell, Steven Bollinger, Jean Buhler, Daniel Dickerson, Keith Fisher, Yvonne Froscher, Shelly Kirschner, John McGlohorn, Rhonda

Mick, William Musser, Beverly Osborne, Theresa Page, Cynthia Seymour, Eric Stolen, Horace Vines, Thomas Ward, Patricia Wright, and William York.

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A NEW SPECIES OF *BIOPHYTUM* (OXALIDACEAE) FROM HONDURAS

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ABSTRACT

The new species *Biophytum zunigae* is proposed.

KEY WORDS: Oxalidaceae, *Biophytum*, species nova

Biophytum zunigae C. Nelson, *sp. nov.* HOLOTYPE: HONDURAS. Atlántida: orillas del río Texíguat, 7 km SE de San José, bosque húmedo tropical, 413 msnm, 16 marzo 1990, *Zúniga 1402* (TEFH); Isotypes: EAP,MO,US.

Herba vel suffrutex foliis 9-10 mm × 10 mm, supra glabris foveolatis, subtus curvatis pubescentibus, nervis secundariis ad 36; pedunculi 16-20 cm longi; pistilla staminibus longiora.

Epiphytic herb or shrub; stem woody, 36 cm long by 3 mm wide, alate, marginate, glabrate at the base, pubescent at the top, decumbent. Leaves 13, pseudoverticillate at the end of the stem, linear subcuneate, to 16 cm long and 2 cm wide; lower leaflets suborbicular or ovate, 9-10 mm long by 8-10 mm wide, acuminate, the acumen or tip ca. 1 mm long, the middle leaflets subfalcate to 28 mm long and ca. 10 mm wide, oblique, acroscopically lobed, basiscopically curved, acroscopically acute, all leaflets glabrous, foveolate on the upper surface, pubescent with curved hairs on the lower surface, ciliate, acuminate; petiole to ca. 3 cm long and ca. 1 mm wide, subtriangular, not fleshy, sulcate, slightly winged, pubescent, rachis pubescent, petiolules to ca. 0.8 mm long, fleshy. Inflorescences 1-2, at first globose then cylindric, to 10 mm long by 5 mm wide; peduncles 16-20 cm long, ca. 1 mm wide, subtriangular, pubescent, equal or longer than the leaves; outer bracts subulate or ovate, long acuminate, ca. 2 mm long, ciliate at the base, less so on the margins, keeled, some keels slightly pubescent, tip ca. 1 mm long, ciliate at the tip;

internal bracteoles similar in size, shape, and pubescence to varying degrees. Flowers with sepals subulate to linear, to 3.2 mm long by 1.0 mm wide, 6-nerved, glabrous on both surface; petals purple, to 7 mm long, glabrous, the lobes 3 mm long; stamens to 2.5 mm long, filament antrorsely pubescent, flattened on the lower part, filiform above, anther glabrous, ca. 0.4 mm long, short stamen ca. 1 mm long, glabrous; pistils to 4 mm long, longer than the stamens, ovary glabrous, ca. 0.9 mm long; styles antrorsely pubescent, to ca. 3 mm long; stigma glabrous, slightly bifid; capsule ca. 9 mm long when immature, glabrous.

The epithet for this species honors the collector, Ramón Zúniga. It differs from *Biophytum dendroides* (H.B.K.) DC. by its longer leaves, leaflets, and inflorescence.

**BIDENS AUREA (ASTERACEAE: HELIANTHEAE): ADVENTIVE
CYTOTYPES IN ARGENTINA**

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ABSTRACT

Bidens aurea (Asteraceae: Heliantheae): Adventive cytotypes in Argentina. – Cytotypes belonging to *Bidens aurea* (Aiton) Sherff are described for the first time for the Buenos Aires province, Argentina. The cytotypes have 60 or 66 chromosomes in somatic cells with aneuploid changes in several cases, $2n = 67$ and $2n = 68$. The chromosome count of $2n = 66$ was confirmed by meiotic analysis ($n = 33$). Morphological traits and the potential weediness of this species are discussed.

KEY WORDS: Asteraceae, Heliantheae, *Bidens*, Argentina, cytology

INTRODUCTION

Bidens L. (Asteraceae: tribe Heliantheae) is a large and widespread genus. It contains over 240 species (Sherff 1937; Crowe & Parker 1981). In Argentina it contains ten species, of which three are extensively distributed throughout the Buenos Aires province (Cabrera 1963). These are *B. laevis* Britton, Sterne, & Poppens; *B. pilosa* L., and *B. subalternans* De Candolle.

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Bidens comprises different chromosome numbers, from $n = 10$ through $n = 73 \pm 3$, 4 (Waisman *et al.* 1986). Covas & Schnack (1946) found $x = 6$, although for other authors the genus has several basic numbers: $x = 10$, 11, 12, 14, and 18 (Turner & Flyr 1966) where $x = 12$ would be the basic modal number with several aneuploids (Solbrig *et al.* 1972; Keil & Stuessy 1977).

The three taxa already mentioned for Buenos Aires province, grow in disturbed lands. Two of these are annuals and grow well in developed soils, while *Bidens laevis* grows in wet conditions and can be annual or perennial. Only *B. pilosa* is a weed of wide distribution all over the world (Bayer Agrochem. Div. 1983).

In this paper we describe for the first time several populations of *Bidens aurea* with weed characteristics.

MATERIALS AND METHODS

Eight populations of *Bidens aurea* from Buenos Aires province (962, 963, 969, 972, 973, 977, 978, and 983) were analyzed. Plants of each locality were grown in clay pots. Voucher specimens were deposited in the herbaria at Balcarce (BAL) and Buenos Aires (SI). For the proper determination of the plant material, morphological measurements of ten individuals of each population were made. The origin and chromosome counts of the examined material are listed in Table 1.

We determined chromosome numbers from root tips using the technique of Núñez *et al.* (1974). The meiotic count of 962 was made by squashing anthers, which previously had been fixed in alcohol:acetic acid (3:1), in acetic acid (45%), and staining them by following Snow's technique (Snow 1963).

A Wild M-20 standard microscope was used for photographs. Pollen fertility was estimated following Alexander (1969).

To estimate the importance of vegetative regeneration, rhizomes of equal weight were sown in clay pots (30 cm diameter) registering the dry weight (DW) of shoot and root modules at the end of a two month growing period.

RESULTS AND DISCUSSION

Description: *Bidens aurea* (Aiton) Sherff, Bot. Gaz. 59:313. 1915.

Common name: Tea herb (Hierba del Té).

Phenology: This species begins to grow in October. It flowers mainly from April to May. Achenes ripen thirty days after ligule expansion.

Studied material:

ARGENTINA. Buenos Aires province: Partido de Gral. Balcarce, waste lands, gardens, country routes, orchards, 29-III-1989 (fl,fr), Montes & Ceron

Table 1: Chromosome numbers reported for *Bidens aurea*.

Collection	Source	<i>n</i>	<i>2n</i>	Reference
<i>B. cf. aurea</i>	Michoacán	24		Powell & Turner 1963
<i>B. aurea</i>			72	Tutin 1976
<i>B. aurea</i>		23, ca. 35		McVaugh 1984
<i>B. aurea</i> 962	Balcarce	33	66	(1)
<i>B. aurea</i> 963	Balcarce		60	(1)
<i>B. aurea</i> 969	M. d. Plata		66-67	(1)
<i>B. aurea</i> 972	M. d. Plata		60	(1)
<i>B. aurea</i> 973	M. d. Plata		60-66-68	(1)
<i>B. aurea</i> 977	M. d. Plata		60-67-68	(1)
<i>B. aurea</i> 978	Pergamino		60-66-68	(1)
<i>B. aurea</i> 983	M. d. Plata		60, ca. 66	(1)

(1): the authors in this paper

962, 963, 976 (BAL), 965, 966 (SI); Partido de Gral. Pueyrredón, provincial route 226, km 10, 3-V-1989 (fl), *Montes & Ceron* 972 (SI); Mar del Plata, ruderal, 15-IV-1989 (fl,fr), *Montes & Ceron* 969, 973 (BAL), 977 (LP), 971, 972, 983 (SI); Partido de Pergamino, Pergamino, ruderal, 20-II-1990 (fl), *Montes & Ceron* 978 (BAL).

URUGUAY. Dto. Montevideo: Montevideo, in vacant sites, 6-IV-1979 (fl,est), *Brescia & Marchesi* 16106 (SI).

MEXICO. Hidalgo: Tlalnalapa, 2,400 a.s.l., 15-X-1978 (fr,fr. est), *Fernández* 15 (SI).

Distribution, habitat, and vegetative propagation:

This species can be found in U.S.A. (Arizona), México, and Guatemala (McVaugh 1984). It grows in wet meadows, swamps, humid slopes in open forests, corn fields, and other crops. It is possible to find it in southeastern Europe (Tutin 1976) and Chile, where it has established in orchards, vineyards, and corn fields (Kogan 1983). It has been found in Montevideo (SI 16106), Uruguay. We have found it in a wide area of Buenos Aires province, growing in wet or dry conditions, in highly fertile soils, being an invader of gardens and orchards.

These populations established in the area about fifteen years ago. They were first cultivated for their colorful flowers (white and yellow ligules).

This rhizomatous perennial is capable of active vegetative propagation (Figure 1). During 60 days (February-March) pieces of rhizomes about 4 cm long, with two nodes, developed plants of 40 cm height with leaves of 13 cm long \times 3 cm wide.

Relationship between DW of rhizomes and DW of shoots was 2:1 (rhizomes $6.5 \text{ gr} \pm 0.5$; shoots $3.0 \text{ gr} \pm 0.4$; $N = 10$) in two months of growth.

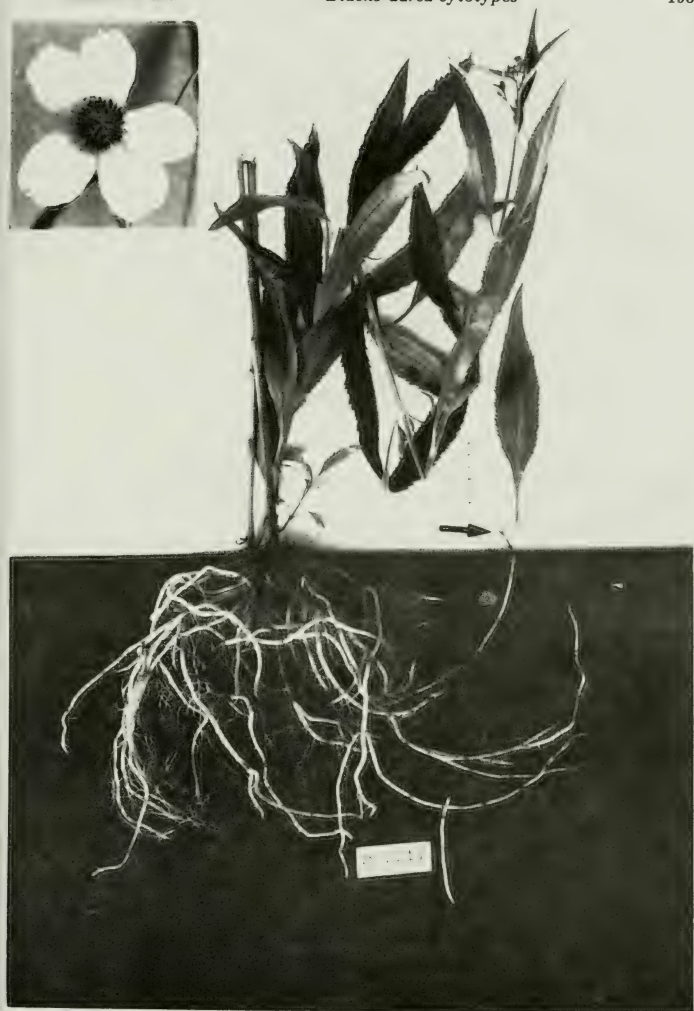


Figure 1. *Bidens aurea* cultivated specimen (963). Arrow indicates a sprout arising from the tip of a rhizome. The inset shows an open capitulum, $\times 0.5$.



Figure 2. *Bidens aurea* meiosis showing anaphase I chromosomes (962), $n = 33$, $\times 4,000$.

Cytological analysis and fertility:

Table 1 shows different chromosome counts from several populations of Buenos Aires province as well as counts on the same species made by other authors.

We found adventive populations of *Bidens aurea* with a somatic complement of 60, 66, 67, and 68 chromosomes. The gametic complement of $2n = 66$ was analyzed at anaphase I (Figure 2).

Covas & Schnack (1946) reported $x = 6$ for the genus, however, other authors cited multibasic counts, $x = 10, 11, 12, 14, 17$, and 18 , where the most probable number would be $x = 12$ (Turner & Flyr 1966; Solbrig *et al.* 1972; Keil & Stuessy 1977).

Up to now, it is not possible to assure what would be the basic number for *Bidens aurea*. The cytotype $2n = 60$ could be decaploid ($2n = 10x = 60$ with $2n = 11x = 66$) or pentaploid ($2n = 5x = 60$) both with several aneuploid cytotypes ($2n = 67, 68$). One of these hypotheses needs to be confirmed.

The chromosome counts cited for another species of the genus indicated a considerable heteroploidy (Turner & Flyr 1966). Our counts are complementary to those found by other authors in *Bidens aurea*. Powell & Turner (1963) indicated $n = 24$; Tutin (1976) $2n = 72$, and later, McVaugh (1984) $n = 23$ and $n = \text{ca. } 35$. These results are similar to those obtained with another species of *Bidens*, e.g., *B. pilosa* with $n = 12, 14, 24, 36$, and 38 (Turner & Flyr 1966),

which supports the suggestion that polyploidization is an active mechanism in the evolution of several species within the genus.

Pollen from several plants averaged 76% stainability, though the adventive populations produced a low proportion of viable achenes (0 = none, up to 10 fertile achenes per capitulum, $\bar{x} = 3$, s.d. ± 2.4 ; $N = 40$). The achene germination varied between 10% and 50%. This confirms the results of other authors for populations growing in Italy (Sherff 1937) and Chile (Kogan 1983).

Although the main form of local propagation seems to be the rhizomatous system, the colonization of different areas within Buenos Aires province suggest that, at least, the achenes play a relatively important role in the geographic propagation of the species.

The different cytotypes of *Bidens aurea* found in Argentina, linked with the invasive characteristics of these plants, as shown by the vigorous growth of the rhizomatous system, makes it important to control the invasion of new areas, given that this species resumes the characteristics of a dangerous weed.

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THREE NEW SPECIES OF *GENIANTHUS* (ASCLEPIADACEAE) FROM THAILAND

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ABSTRACT

Three new species of *Genianthus* (Asclepiadaceae) are described on material from the northern and western mountain areas of Thailand. They are all similar to the Indian-SE Asian *G. laurifolius*, one found only in Thailand, the two others also in the southeastern Himalayas.

KEY WORDS: Asclepiadaceae, *Genianthus*, Thailand, new species

During the course of a study of phylogenetic interrelationships in the paleotropical tribe Secamoneae (Asclepiadaceae), I have come across three new species of the Asian genus *Genianthus*, one of usually five recognized genera within the tribe.

Genianthus was described by Hooker (1883: 15) who included three species characterized by bearded corolla lobes and valvate aestivation. The generic delimitations within the tribe are not distinct and the characters used for the delimitation of *Toxocarpus* and *Secamone*, the two large genera within the tribe, are diffuse (Klackenberg 1992: 8). The bearded corolla lobes are characteristic and a possible synapomorphy of *Genianthus*. The aestivation, however, stated by Hooker as being valvate, is in fact usually slightly contorted. There are about fifteen species of *Genianthus* distributed from the Himalayas to Indonesia and from southwestern India to the Philippines with most taxa found in Malaysia. However, only two taxa, *G. laurifolius* (Roxb.) Hook. f. and *G. crassifolius* (Wight) Hook. f. are hitherto reported from Thailand. Here are now added three more species, which are all similar to *G. laurifolius* in general appearance and in gross flower morphology. On the other hand, *G. crassifolius* belongs to a group characterized by a different type of inflorescence, i.e., sparsely branched with the flowers on brachyblasts. The three species described here as well as *G. laurifolius* all lack brachyblasts and are furnished with more or less profuse multiple thyrses.

Genianthus bicoronatus Klack., *spec. nov.* HOLOTYPE: THAILAND.
 Hiu Hia, base of Doi Chiengdao, ca. 480 m alt., 1941, *Garrett 1234*, (L);
 Isotypus: E.

Species haec *G. laurifolio* (Roxb.) Hook. *f.* similis sed differt
 lobis coronae distincte duplicibus cum lobo interiore caudatiformi
 et cum stigmate peltiforme.

Suffrutescent twiner with youngest branches covered with short retrorse reddish hairs. Leaves herbaceous, flat or slightly revolute at the very margin; blade 7-13 × 3-8 cm, ± elliptic to broadly elliptic, cuneate at the base, abruptly acuminate at the apex, glabrous, with many glands at the very base above; venation pinnate, arched to looped, with light-coloured nerves when dry; midrib impressed near the petiole above, raised below; epidermis ± smooth on both sides of the leaf; petiole 2-4 cm long. Inflorescences extraaxillary, shorter than the adjacent leaves; cyme a multiplex thyrses, lax but with flowers in several rather dense clusters, many-flowered, pubescent, with few axes ca. 2-3 cm long but with much shorter ones towards the apex; pedicels up to 2 mm long; bracts ca. 1 mm long. Calyx lobes 1.1-1.6 × 0.8-1.2 mm, ovate to broadly elliptic, rounded at the apex, with sparse appressed reddish hairs outside, with latex cells. Corolla slightly contorted with the left lobe margin overlying and with the lobes fused for 1/3 - 2/9 of their length into a tube, with abundant latex cells, yellow to yellowish orange; tube 0.5-1 mm long, hairy especially near the mouth; lobes 1.8-2.3 × 1.0-1.5 mm, somewhat accrescent and marcescent after anthesis, oblong, rounded at the apex, with dense long hairs at inner surface, rather thin. Staminal column 0.9-1.1 mm high. Coronal lobes double, outer ones much broader, dorsiventrally compressed, broadly ovate to ± circular in outline, inner ones longer, caudate, ± straight, about as long as the thecae. Pollinia ca. 0.1 mm long, ellipsoidal. Stigma head projecting above the staminal column; upper narrower part about as long as the lower broader part, ca. 0.5 mm long, entire, distinctly flat and broadened at the apex covering the staminal column. Follicles 9-12 × 0.5-1 cm, very narrowly ovate to linear in outline, rather thick-walled, glabrous, recurved ca. 90°. Seeds not seen.

Additional collections examined: CHINA. Yunnan: *Henry 13009*, Sze mao (NY); *Rock 2568*, between Keng Hung and Muang Hing, in the valley of Meh Kong, near Pnag Khun, between Muang Mah, 1922 (A); *Wang 77737*, Dah-meng-lung, Che-li, 950 m alt., 1936 (A, IBSC).

BURMA. *Kurz 2358*, Pegu, Yoma (K); *MacGregor 1210*, S Shan States (E); *Po Khant 16*, Insein Distr., Myaukhlaing reserve, 30 m alt., 1948 (A); *Rock 2326*, Shan State, Keng Tung, between Muang Mah and the Chinese-Yunnan border, 850-950 m alt., 1922 (A).

THAILAND. *Kerr 2910*, Chiang Mai, Ban Pong Yaeng, between Me Rim and Samong, 750 m alt., 1913 (BM, E, K).

Genianthus bicoronatus is distributed in the mountains in Yunnan in southern China to northern Thailand. It is said to grow in evergreen forest between 400 and 1000 m altitude. Flowering specimens seen from January and February.

This species is in its general stature much resembling *Genianthus laurifolius* known from southern India, southern Thailand and Vietnam. It differs, however, very distinctly in the structure of the gynostegium, having an outer broad almost circular coronal lobe but also a much longer caudate inner one. It is the only taxon within the genus having a very distinctly flat and broadened stigma head giving the appearance of a mushroom covering the anther column.

***Genianthus hastatus* Klack., spec. nov.** HOLOTYPUS: THAILAND. Nan Prov., Doi Phu Ka, 1450 m alt., 1990, *Banziger 668* (K).

Species haec a *G. laurifolio* (Roxb.) Hook. f. differt lobis corollae distincte duplicibus cum lobo externo hastato et inflorescentia longiore >5 cm longa.

Suffrutescent twiner with younger branches covered with \pm retrorse short reddish hairs. Leaves herbaceous, flat or slightly revolute at the very margin; blade ca. $8-10 \times 4-5$ cm, elliptic to somewhat oblong, cuneate to usually truncate at the base, acuminate at the apex, with sparse many-celled hairs mostly below and along the nerves, with many glands at the very base above; venation pinnate, arched to looped, with darker-coloured nerves when dry, \pm reticulate; midrib impressed near the petiole above, raised below; epidermis \pm smooth on both sides of the leaf; petiole 1.5-2.0 cm long. Inflorescences extraaxillary, shorter to much longer than the adjacent leaves; cyme a multiplex thyrs, rather lax but with flowers in several rather dense clusters, many-flowered, pubescent, with longer and shorter axes alternating, up to 4 cm long but with much shorter ones towards the apex; pedicels 2-3 mm long; bracts ca. 1 mm long. Calyx lobes $1.1-1.4 \times 0.8-1.1$ mm, elliptic to ovate, rounded at the apex, with appressed reddish hairs outside, with latex cells. Corolla slightly contorted with the left lobe margin overlying and with the lobes fused for ca. $1/3$ of their length into a tube, with dense long hairs at inner surface, with abundant latex cells; colour unknown; tube ca. 1.0 mm long; lobes ca. $1.6-2.0 \times 1.0-1.2$ mm, somewhat accrescent and marcescent after anthesis, oblong, rounded at the apex, rather thin. Staminal column ca. 1.1-1.3 mm high. Coronal lobes double, outer ones triangular in outline with flat back and hastate base, inner ones narrower and longer but shorter than the thecae. Pollinia ca. 0.1 mm long, ellipsoidal. Stigma head slightly projecting above the staminal column; upper narrower part about as long as the lower broader part, ca. 0.5 mm long, entire, \pm broadened near the apex. Fruits and seeds not seen.

Additional collections examined: INDIA. *Cave s.n.*, Sikkim, above Labdah (A,G); *Chand 4388*, India, Assam, Lushai Hills, Hmunta (L).

Genianthus hastatus is known from Sikkim and Assam in India as well as from northern Thailand and has been reported from forest at ca. 1500-2000 m altitude. Flowering specimens seen from April and May.

This species has been confused with *Genianthus laurifolius*, but differs in several characters, viz. shape of coronal lobes and stigma head, type and density of pubescence, and type of inflorescence. *Genianthus hastatus* has more clearly double coronal lobes. Furthermore, the outer lobe is narrower and triangular in outline with a hastate base, jutting out creating a large cavity between the lobes. In *G. laurifolius* as well as in *G. bicoronatus* and *G. siamicus*, the next species, the outer coronal lobes are broad, sometimes almost circular, with the margins pressed to each other. *Genianthus hastatus* has darker veins at the lower side of the leaves when dry, quite different from the whitish ones of *G. laurifolius* and *G. bicoronatus*. The inflorescences are longer (>5 cm long) than those of *G. laurifolius*, and with ca. 1 mm long bracts compared with the minute ones less than 0.5 mm long found in *G. laurifolius*. The inflorescences are also more branched, multistoried. In contrast, *G. laurifolius* has inflorescences consisting of several branches from near the stem, each less than 5 cm long, and with one major branching point with three clusters of flowers at each. The leaf hairs of *G. hastatus* and also of *G. siamicus* are multicellular of a type found on leaves within *Genianthus* otherwise only in combination with flowers on brachyblasts. The stigma head differs from *G. laurifolius* by having its upper narrower part almost as long as the broader lower one (not much shorter) and projecting slightly above the staminal column. It is furthermore slightly broadened but not at all mushroom like as in *G. bicoronatus*. As in all species here discussed, the bark is glossy with many lenticels.

***Genianthus siamicus* Klack., spec. nov. HOLOTYPE: THAILAND.**

Kanchanaburi Prov., Khao Yai, E Sangkhla, ca. 1150 m alt., 1968, *van Beusekom & Phengkhlai 200* (L).

Species haec a *G. laurifolio* (Roxb.) Hook. f. differt inflorescentia longiore et a *G. hastato* Klack. lobo coronae latiore et rectangularis non hastato differt.

Suffrutescent twiner with younger branches covered with short \pm retrorse reddish hairs. Leaves herbaceous, flat or slightly revolute at the very margin; blade ca. 13 \times 5.5 cm, elliptic, cuneate at the base, acuminate at the apex, with sparse many-celled hairs on both sides, with many glands at the very base above; venation pinnate, arched to looped, with darker-coloured nerves when dry, \pm reticulate; midrib impressed near the petiole above, raised below; epidermis \pm smooth on both sides of the leaf; petiole 1.5-2.0 cm long.

Inflorescences extraaxillary, probably \pm as long as the adjacent leaves; cyme a multiplex lax thyse, ?many-flowered, sparsely pubescent but more densely so at the bracts, with longer and shorter axes alternating, up to 8 cm long but with much shorter ones towards the apex; pedicels 2-3 mm long; bracts ca. 1 mm long. Calyx lobes ca. 1.6×1.0 mm, elliptic to oblong, rounded at the apex, glabrous or with a few reddish hairs outside, with latex cells. Corolla slightly contorted with the left lobe margin overlying and with the lobes fused for $2/5 - 1/3$ of their length into a tube, with dense long hairs but more sparsely so at the tube at inner surface, with abundant latex cells, pale yellow; tube ca. 1.2 mm long; lobes ca. 2.1×1.2 mm, somewhat accrescent and marcescent after anthesis, oblong, obtuse at the apex, rather thin. Staminal column ca. 1.0 mm high. Coronal lobes double, dorsiventrally compressed, outer ones broad and \pm rectangular in outline with the margins pressed to each other, inner one narrower and somewhat arched inclining towards the stigma head, longer than the thecae. Pollinia slightly shorter than 0.1 mm long, ellipsoidal. Stigma head distinctly projecting above the staminal column; upper narrower part about as long as the lower broader part, ca. 0.8 mm long, entire, club-shaped. Fruits and seeds not seen.

Genianthus siamicus is known only from the type collected near the Burmese border in western Thailand. It was found in flower in March in dry evergreen forest at ca. 1150 m altitude.

This species differs from *Genianthus laurifolius* by its profuse inflorescence and multicellular leaf hairs. In both these characters it is similar to *G. hastatus* from which it is differentiated by its broad and rectangular coronal lobes completely covering the lower half of the anther wings.

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REVISION OF SOUTH AMERICAN SPECIES OF *PERYMENIUM*
(ASTERACEAE, HELIANTHEAE)

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ABSTRACT

The genus *Perymenium* in South America is revised. In this region it is composed of seven species largely confined to montane habitats of Colombia, Ecuador, and Perú. Three new species are described: *P. celendianum* B.L. Turner, from Cajamarca, Perú; *P. colombianum* B.L. Turner, from Antioquía, Colombia; and *P. huascaranum* B.L. Turner, from Ancash, Perú. In addition, the often used names *P. ecuadoricum*, *P. matthewsii*, and *P. serratum* are reduced to synonymy under the earlier name *P. jelskii*. A key to species and complete synonymy is provided along with distributional maps.

KEY WORDS: Asteraceae, Heliantheae, *Perymenium*, Colombia, Ecuador, Perú

Fay (1978) provided a revisional study of the North American species of *Perymenium*, a group of closely related taxa readily recognized by their mostly fertile ray florets, 3-sided ray achenes, and radially flattened, usually winged, disk achenes. Both achene types bear a pappus of 10-20 fragile, readily detached, hispidulous bristles which arise from a well-defined boss, and chromosome numbers on a base of $x = 15$.

Subsequent to Fay's treatment, in which 33 species were recognized for North America, Turner (1988a) expanded the genus somewhat with the transfer of the monotypic genus *Perymeniopsis* H. Rob. into *Perymenium* (based upon *Oyedaea ovalifolia* A. Gray), the latter largely distinguished by its sterile ray florets. In addition, Turner (1987, 1988b, 1991, 1992a, 1992b, 1993) added six new species from México, and Panero *et al.* (1993) added another, bringing to about 40 the number of species currently recognized for North America.

The South American taxa are comparatively poorly known, and while only seven species are recognized here, additional species are certain to be added as

exploration of the Andean regions is expanded, especially in Perú where the center of diversity of *Perymenium* in South America appears to be. Compared to the North American species (mainly Mexican), the South American elements are relatively homogeneous, the species largely recognized by leaf shape and vestiture, and they probably represent a monophyletic assemblage, perhaps most closely related to the Central American species *P. grande* Hemsl., but this is largely speculation, based mainly upon geographic considerations.

KEY TO SPECIES

1. Leaves linear-lanceolate, 8-10 times as long as wide. *P. lineare*
1. Leaves variously ovate to deltoid, 2-5 times as long as wide.
 2. Anther appendages black or blackish; inner involucre bracts 4-6 mm wide near their apices; Colombia. *P. colombianum*
 2. Anther appendages yellow; inner involucre bracts mostly 2-4 mm wide near their apices; Ecuador and Perú.
 3. Involucres 10-12 mm high; peduncles densely beset with spreading white-pilose hairs 1-2 mm long; occurring from 3300-3900 m, Huascarán Natl. Park, Perú. *P. huascanum*
 3. Involucres 5-9 mm high; peduncles variously pubescent but not as described in the above; occurring from 1000-3200 m, widespread.
 4. Perennial herbs 20-100 cm high; leaves mostly 2-4(5) cm long. *P. bishopii*
 4. Shrubs or small trees (1-)-2-6 m high; leaves mostly 5-15 cm long.
 5. Leaves variously pilose beneath, the hairs mostly erect but never inter-tangled and forming a velvety undersurface so as to give the blades a bicolored aspect; widespread along the front ranges of the Andes, Colombia to central Perú. *P. jelskii*
 5. Leaves densely pilose or strigose-pilose beneath, the white or whitish hairs mostly to some degree intertangled forming velvety undersurfaces giving the blades a bicolored aspect; Perú mostly interior ranges of the Andes.
 6. Leaves clearly rugose above, the undersurfaces with markedly raised-reticulate venation, the vestiture of essentially erect or ascending pilose hairs, these all alike

or nearly so; Dept. Celendín, Cajamarca, Perú.

..... *P. celendianum*

6. Leaves not as described in the above, the undersurfaces with a matted-mesh of entangled hairs, the major veins with stiffly appressed straight hairs; widespread in Perú from southern Amazonas Province to Apurímac and Cusco Provinces. *P. featherstonei*

Perymenium bishopii H. Rob., Phytologia 52:54. 1983. TYPE: PERU. Cajamarca: 8 km E of Cajamarca along road to Celendín, 8500 ft, 9 Jan 1983, R.M. King & L.E. Bishop 9122 (HOLOTYPE: US!; Photoholotypes: MO!, NY!; Isotypes: F!, NY!).

Spindly suffruticose perennial herbs 25-100 cm high. Stems brown, strigose with hairs appressed upwards. Larger leaves on primary shoots mostly 3-5 cm long, 0.8-1.5 cm wide; petioles 1-3 mm long; blades lanceolate, somewhat bicolored, 3-nervate from or near the base, densely pubescent beneath with tufts of entangled soft hairs, the veins prominently strigose with straight stout appressed hairs 1-2 mm long, the margins weakly crenulate to crenulodentate. Capitulescence a loose arrangement of 1-10 heads, the ultimate peduncles mostly 2-10 cm long. Fruiting involucre broadly campanulate to hemispheric, 5-8 mm high, 15-20 mm across, the bracts ca. 3-seriate, subgraduate, broadly ovate to ovate-oval, minutely strigose, weakly ciliate. Ray florets 8-13, the ligules yellow, 10-15 mm long. Disk florets numerous (50+), the corollas yellow, 4-5 mm long, glabrous, the tube ca. 1 mm long. Ray achenes 3-sided, ca. 3 mm long, weakly winged above, the pappus of ca. 15 bristles 1-2 mm long; disk achenes tangentially flattened, ca. 3 mm long, narrowly winged, the pappus of ca. 15 bristles 1-2 mm long.

DISTRIBUTION AND ECOLOGY (Figure 1): known only from northern Perú in the Provinces of Cajamarca and Ancash where it reportedly occurs along roadsides and in disturbed brushy areas, 2700-3200 m; flowering December-March.

In his original description, Robinson correctly noted this species is seemingly closest to *Perymenium featherstonei*. The latter species is readily distinguished from *P. bishopii* by its decidedly shrubby habit (mostly 1.5-3.0 m high vs. 1 m or less) and mostly larger leaves (mostly 4-8 cm long vs. 3-5 cm; 1.5-3.0 cm wide vs. 0.8-1.5 cm). Indeed, *P. featherstonei* appears to stand somewhere between *P. bishopii* and *P. jelskii*, the latter having a yet more robust habit and larger leaves, the latter with hairs scarcely matted, if at all.

REPRESENTATIVE SPECIMENS: PERU. Ancash: Prov. Bolognesi, below Chiquián, 3100-3200 m, 9 May 1950, Ferreyra 7314 (US); Prov. Carhuaz,



Figure 1. Distribution of *Perymenium bishopii* (closed circle) and *P. celendianum* (open circle).

6 km S of Carhuaz, ca. 7000 ft, 10 Jan 1982, *King & Collins 9025* (US).
Cajamarca: Prov. Cajamarca, 27 km N. of San Marcos, ca. 2765 m, 11 Jan
1983, *Dillon et al. 2866* (F,US).

Perymenium celendianum B.L. Turner, *sp. nov.* TYPE: PERU. Cajamarca: Prov. Celendn, canyon of the Río Marañón above Balsas, 8.5 km below summit of the road to Celendín, 2740 m, 27 May 1964, *Paul C. Hutchison & J. Kenneth Wright 5390* (HOLOTYPE: F!; Isotypes: GH!,NY!). According to information on a separate label ("additional field notes"), the plant was said to be "Common, but mostly finished flowering. A dominant species here."

Perymenio featherstonei S.F. Blake similis sed vestimento foliorum denso uniformi trichomatibus erectis molliisque, foliis valde rugosis in paginis superis nervis subtus elevatis valde reticulatis, et bracteis involucri valde ciliatis (vs. prope vel omnino eciliatis) differt.

Shrubs 1-2 m high. Stems brownish, pilose with white spreading hairs 1-2 mm long. Larger leaves mostly 5-9 cm long, 3.0-4.5 cm wide; petioles 5-15 mm long; blades ovate, markedly rugose, somewhat bicolored, 3-nervate from or very near the base, markedly pilose above and below with soft slender hairs, the latter essentially uniform in texture, the lower surfaces markedly reticulate and the hairs erect and more dense than upon the upper surfaces, the margins rather uniformly crenulodentate. Heads 10-30, arranged in terminal cymes, the ultimate peduncles mostly 1-3 cm long. Fruiting involucre broadly campanulate, 5-7 mm high, 12-16 mm across, 3-4 seriate, graduate, the outer most bracts broadly ovate or oval, 2-3 mm long, the inner bracts oblanceolate with markedly white-ciliate margins. Pales oblanceolate with abruptly acute apices, ca. 2/3 as long as the subtended florets. Ray florets 11-15, the ligules yellow, 10-18 mm long. Disk florets numerous (50+), the corollas ca. 4.5 mm long, glabrous, the tube ca. 1-2 mm long. Anther appendages yellow, glandular. Ray achenes 3-sided, faintly winged, ca. 3 mm long, the pappus of 10-12 bristles ca. 1 mm long, a single longer bristle ca. 2 mm long; disk achenes radially compressed, ca. 2.5 mm long, scarcely winged, if at all, transversely corrugate, the pappus of 15-20 bristles ca. 1 mm long, and 1 or 2 longer bristles 2-3 mm long.

DISTRIBUTION AND ECOLOGY (Figure 1). Known only from type material.

Perymenium celendianum is obviously closely related to *P. featherstonei* but differs in having markedly rugose leaves, the undersurfaces with markedly raised reticulate veins and a thick vestiture of very uniform erect soft hairs; in

addition, the inner bracts are markedly ciliate and the achenes possess longer pappus bristles.

The Province of Celendín is not known to contain yet other species of *Perymenium*, although the District of Cajamarca, to which it belongs, contains at least three other species, namely *P. bishopii*, *P. featherstonei*, and *P. jelskii*. So far as known none of these has been collected growing with another at the same locale, each appearing to have its own habitat proclivities.

***Perymenium colombianum* B.L. Turner, *sp. nov.* TYPE: COLOMBIA.**

Antioquía: Near top of Cordillera Occidental, 44 km NW of Antioquía, montane forest remnant on steep slope above road, 2100 m, 9 Oct 1977, *Al Gentry & Henry Leon 20297* (HOLOTYPE: MO!).

Perymenio jelskii (Hieron.) S.F. Blake similis sed capitulis majoribus plerumque paucioribus in pedunculis longioribus (4-10 cm vs. 1-4 cm) et appendicibus antherarum atris vel denigratis (vs. luteis) differt.

Shrub or small tree to 4 m high. Stems densely appressed pilose. Larger leaves 8-12 cm long, 3-6 cm wide; petioles 1-2 cm long; blades broadly lanceolate to ovate, 3-nervate from somewhat above the base, the undersurfaces appressed pilose with relatively uniform hairs, the margins crenulodenticulate. Heads mostly 3-8 to a stem, arranged in very loose cymes, the ultimate peduncles mostly 4-12 cm long. Involucres hemispheric, 10-15 mm high, 20-30 mm across (pressed), the bracts subgraduate, 3-4 seriate, the outer series broadly obovate, loose, herbaceous, the inner series similar but longer and scarious throughout, reticulate-veined with rounded apices. Pales shorter than the florets, their apices erect, acute. Ray florets 8-13, the ligules yellow, ca. 15 mm long, 4-5 mm wide. Disk florets numerous (50+), the corollas yellow, glabrous, 5-6 mm long, the tubes ca. 1.5 mm long. Anther appendages black or blackish, the dorsal side with 6-10 sessile glands. Ray achenes 3-sided, ca. 4 mm long, wingless or nearly so, the pappus of 10-15 bristles 1-2 mm long; disk achenes ca. 4 mm long, narrowly winged throughout, the pappus of 10-15 bristles 1-3 mm long.

This taxon in habit and vegetative features much resembles *Perymenium jelskii*. It is readily distinguished from the latter by its fewer, larger heads on longer peduncles. Technically, it can also be recognized by its black or blackish anther appendages with 6 or more dorsal glands (vs. yellow with fewer glands in *P. jelskii*).

ADDITIONAL SPECIMEN EXAMINED: COLOMBIA. "Palacé" without collector or date but numbered as "B.T. 505" and written on a printed label with the heading, "Herbarium Lehmannianum Colombianum" (F).

Perymenium featherstonei S.F. Blake, J. Wash. Acad. Sci. 16:222. 1926.

TYPE: PERU. Junín: river canyon at Cabello, a hacienda ca. 14.5 km above Huertas, 2440 m, 25 Jun 1922, *Macbride & Featherstone 1329* (HOLOTYPE: F!; Photoholotype: NY!; Isotypes: GH!, US!).

Spindly shrublet or shrub 1-3 m high. Stems mostly closely appressed-strigose with upturned hairs. Larger leaves mostly 4-8 cm long, 1.5-3.0 cm wide; petioles 0.5-1.0 cm long; blades broadly lanceolate to ovate, rugose, 3-nervate from or near the base, densely white-pubescent beneath with mostly matted or entangled hairs, along the major veins an array of stout appressed hairs 1.0-2.0 mm long, the margins crenulodentate. Capitulescence of 3-20 heads arranged in terminal open cymes, the ultimate peduncles mostly 2-7 cm long. Involucres, in fruit, broadly campanulate, 6-8 mm high, 10-15 mm wide, the bracts ca. 3-seriate, subgraduate, minutely hispidulous, broadly ovate to oval-ovate, their apices mostly rounded, minutely ciliate or not. Ray florets 8-13, the ligules yellow or orange-yellow, 8-12 mm long. Disk florets numerous (50+), the corollas yellow, 5-6 mm long, glabrous, the tubes ca. 1.3 mm long. Ray achenes ca. 3 mm long, 3-sided, faintly winged above, the pappus of 15-20 bristles to 1 mm long; disk achenes similar to those of the ray, but radially compressed and with somewhat larger wings, the pappus bristles mostly 1-2 mm long.

DISTRIBUTION AND ECOLOGY (Figure 2): Northern Perú, mostly along ravines, canyons and streams, rocky places in shallow soils, 1200-2500 m; January-June.

The small, somewhat bicolored leaves with hairs densely matted on the lower surfaces readily distinguish this taxon from *Perymenium jelskii*. The two species are not known to grow together but they have been collected in relatively close proximity in the Provinces of Amazonas and Cajamarca (Figure 3); in general, however, *P. featherstonei* occurs along the eastern side of the Andes, while *P. jelskii* is largely confined to the more western portions.

REPRESENTATIVE SPECIMENS: PERU. Amazonas: 6 kms E of Chapoyas along the road to Mendoza, ca. 6700 ft, 12 Jan 1983, *King & Bishop 9159* (F,GH,MO,US). Ancash: ca. 6 km S of Carhuaz, ca. 7000 ft, 10 Jan 1982, *King & Collins 9025* (F,US). Apurímac: Prov. Andahuaylas, lower Río Chincheros, 2200 m, 1 Mar 1939, *Stork & Horton 10786* (F,GH). Cajamarca: Prov. Cajamarca, ca. 22.5 km S of Cajamarca on road to Chilete, ca. 2740 m, 19 Jan 1983, *Dillon et al. 3039* (F). Huánuco: Huánuco, ca. 7000 ft, 28 Apr 1923, *Macbride 3524* (F,GH,US).

Perymenium huascaranum B.L. Turner, *sp. nov.* TYPE: PERU. Ancash: Prov. Huaylas, Huascarán National Park, Quebrada Santa Cruz between Lago Santa Cruz Chico and Cashapampa exit, 3350-3870 m, 17 Jan 1985, *D.N. Smith, L. Sanchez, & H. Vidaurre 9335* (HOLOTYPE: MO!).



Figure 2. Distribution of *Perymenium colombianum* (solid square), *P. feathirstonei* (open circle), and *P. huascaranaum* (closed circle).

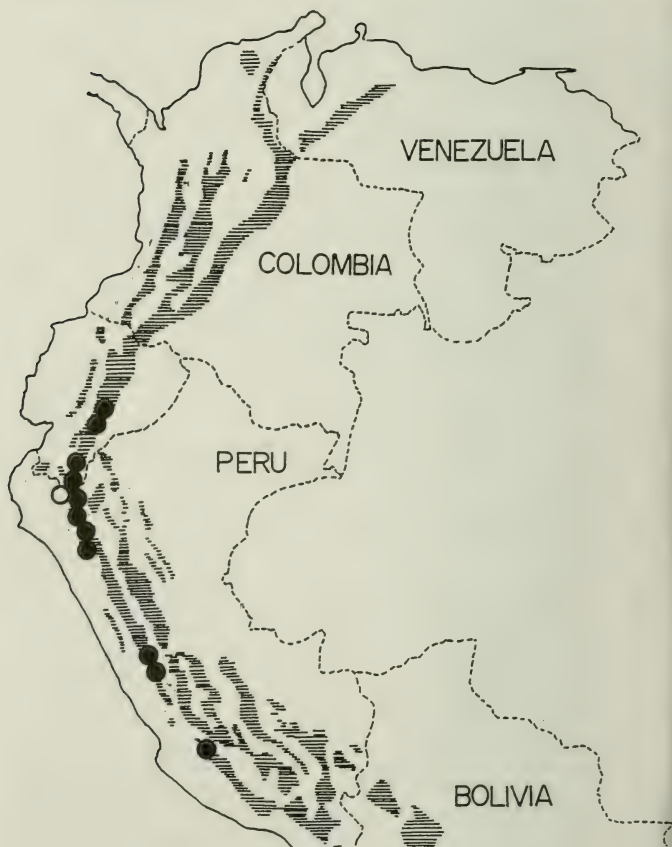


Figure 3. Distribution of *Perymenium jelskii* (closed circles) and *P. lineare* (open circles).

Perymenio featherstonei S.F. Blake similis sed differt capitulis majoribus bracteis involucro herbaceis subaequalibusque, pedunculis crassis, et pedunculis ac caulibus superis dense velatis trichomatibus longis pilosis albisque.

Shrublet to 1.5 m high. Stems brown, densely pilose, the hairs 1-2 mm long. Leaves 5-7 cm long, 2.2-3.0 cm wide; petioles 2-4 mm long; blades broadly lanceolate to ovate, 3-nervate from 6-8 mm above the base, densely pubescent beneath with soft intermeshed pilose hairs, the major nerves with straight slender appressed hairs 1-2 mm long, the margins crenulodentate. Heads arranged 3 to a shoot, borne upon thick subequal densely pilose peduncles 2-3 cm long. Involucres hemispheric, 10-12 mm high, 20-30 mm wide (pressed), the bracts 2-3 seriate, herbaceous, green, subequal, broadly ovate, the innermost with broadly acute to obtuse apices, the surfaces loosely pilose. Ray florets ca. 18, the rays deep yellow, ca. 15 mm long, ca. 6 mm wide. Disk florets numerous, the corollas yellow, 5-6 mm long, glabrous, the tubes ca. 1 mm long. Disk achenes (immature) ca. 3 mm long, the pappus of 15-20 bristles 1-3 mm long.

DISTRIBUTION AND ECOLOGY (Figure 2): Known only from the type locality where it reportedly occurs in relatively arid shrublands, 3350-3870 m.

The species is seemingly most closely related to *Perymenium featherstonei*, having the leaves of the latter, but readily distinguished by its much larger, fewer heads with subequal herbaceous bracts and densely pilose vestiture of its peduncles. Additionally, *P. huascanum* reportedly occurs between 3350-3870 m, while *P. featherstonei* is seemingly confined to an elevational range of 1200-2800 m.

Perymenium jelskii (Hieron.) S.F. Blake, Bot. Gaz. 74:423. 1922. BASIONYM: *Wedelia jelskii* Hieron., Bot. Jahrb. Syst. 36:488. 1905. TYPE: PERU. Cajamarca: Prov. Cutervo, "prope Callacate", Apr 1879, *C. de Jelski 660* (LECTOTYPE [selected here]: B, original collection destroyed; Isolectotype: US!). Hieronymus, in his protologue, also cited *Jelski 662* from "prope Callacate"; photographs of this paratype are at F!, TEX!, and a fragment is in a packet at US!).

Perymenium matthewsii S.F. Blake, J. Bot. 53:136. 1915. TYPE: PERU. Lima: Prov. Lima: "Purruchuca" [Puruchuca?], *Matthews 765* (LECTOTYPE [selected here]: K; Isolectotypes: B, NY!; Photolectotypes and fragment: GH!).

Perymenium serratum S.F. Blake, J. Bot. 53:136. 1915. PERU. Amazonas: Prov. Chachapoyas: Chachapoyas, *Matthews s.n.* (LECTOTYPE [selected here]: B; Photolectotype and fragment: GH!;

Isolectotype: B; Fragment from B isolectotype GH!; Probable isolectotype: GH!).

Perymenium ecuadoricum S.F. Blake, Bot. Gaz. 74:423. 1922. TYPE: ECUADOR. Chimborazo: Huigra, 3 Aug 1920, *E.W.D. & Mary M. Holway 828* (HOLOTYPE: US!).

Variouly described as a shrublet, small tree or tree 1-6 m high. Stems strigo-pilose to pilose with griseous hairs. Larger leaves (on primary shoots) mostly 5-15 cm long, 3-6 cm wide; petioles 1-3 cm long; blades ovate to broadly ovate, 3-nervate from near or somewhat above the base, moderately to densely pilose above and below with mostly soft, erect or ascending-recurved, quite similar hairs, the margins dentate to crenulodentate. Capitulescence of 3-30 heads arranged in terminal cymes, the ultimate peduncles mostly 1-5 cm long (rarely up to 10 cm long). Involucres broadly campanulate, in fruit 1-2 cm across, 6-10 mm high, the bracts 3-4 seriate, subimbricate, ovate to ovate-elliptic, variously strigose to nearly glabrate. Ray florets 8-21, the ligules yellow, 1-2 cm long. Disk florets numerous, the corollas 4-5 mm long, the tube ca. 1 mm long, glabrous except for the hispidulous lobes. Achenes, those of the ray, 3-sided, 2.5-3.0 mm long, essentially wingless, or only narrowly winged at the apex, the pappus of 15-20 deciduous bristles 1-3 mm long; those of the disk similar but the body 2-sided, radially compressed.

REPRESENTATIVE SPECIMENS: ECUADOR. Bolívar: en la quebrada de Atiacagua, road between Chillanes-Tambillo-Trigoloma, 1800-1850 m, 6 Sep 1987, *Zak & Jaramillo 2770* (F,MO,NY,TEX,US). Cañar: between Ducur and Cochancay, 1600-1800 m, 13 May 1974, *Harling & Anderson 14579* (US). Chimborazo: ca. 35 km NE of Bucay, along the road to Riobamba, ca. 4200 m, 30 Jan 1976, *King & Garvey 6960* (F,MO,NY,US). Loja: ca. 2 km N of Loja, ca. 6100 ft, 25 Jan 1976, *King & Garvey 6908* (F,MO,NY,US).

PERU. Amazonas: near Ubilon, between Chachapoyas and Leimebamba, 1950-2000 m, 12 Apr 1950, *Ferreya 7099* (MO,US). Cajamarca: Prov. Conchucos, ca. 10 km above Cascas, 1835-1900 m, 14 Apr 1986, *Dillon et al. 4504* (F,TEX); Andalo (San Beito-Yelen), ca. 1800 m, 1 Apr 1981, *Sagástegui 9624* (F,MO). Ica: 44 km eastward along road to Puquio, 2335 m, 15 Mar 1971, *Ellenberg 4907* (US). La Libertad: Prov. Otuzco, Chanchacap (Agallpampa-Salpo), ca. 260 m, 24 May 1984, *Sagástegui 11669* (F,NY,TEX,US). Lambayeque: Prov. Lambayeque, 28 km E of Olmos, 1150-1200 m, 4 Jan 1964, *Hutchinson & Wright 3405* (F,GH,NY,US). Lima: Matucana, ca. 8000 ft, 12 Apr - 3 May 1922, *Macbride & Featherstone 300* (F,GH,US). Piura: Prov. Huancabamba, between Olmos and Jaén, 2000-2100 m, 22 Apr 1964, *Ferreya 15654* (US).

DISTRIBUTION AND ECOLOGY (Figure 3): Montane habitats in tropical deciduous forests from central Ecuador southwards to central Perú, mostly 1100-2600 m; flowering mostly January-May.

Perymenium jelskii is a widespread, highly variable species, especially in leaf shape and vestiture. In general, plants from the provinces of Bolívar, Chimborazo, and Cañar in Ecuador have somewhat larger leaves than occur in the more southern populations. But exceptions to this generality occur, thus *Sagástegui* 9821 (F, from Cajamarca Province, Perú) has leaves fully as large as those from populations to the far north; likewise, *King & Garvey* 6908 (from Loja, Ecuador, cited above) have leaves fully as reduced as occur in populations south of Lima, Perú.

Blake, in his description of *Perymenium ecuadoricum*, noted that the latter was "closely related to the Peruvian *P. jelskii* ..." but reckoned it differed in having "griseous" rather than "pale green" vestiture on the undersurface of leaves and was also said to have shorter petioles (4-7 mm long vs. 7-20 mm). The 80 or more collections from over a wide area assembled since that time clearly suggest that but a single variable species is involved.

Perymenium lineare S.F. Blake, J. Bot. 53:135. 1915. TYPE: COLOMBIA(?). Magdalena: without further locality, 1852-1853, *Warscewicz s.n.* (HOLOTYPE: K; Fragment holotype: GH!). This locality is questionable. Blake, in penciled notation on his personal reprint of the original description (TEX), noted the type specimen "is labelled simply 'Magdalena Warscewicz' and its reference to Colombia is based on inference: see the account of W's collecting in Bonplandia 1854, p. 95 et seq." However, Warscewicz collected in both northern Perú and Colombia (Dillon, pers. comm.) and it is likely that the plant concerned was collected in Perú. It is possible that the Colombian locale is correct, but the only other specimens I have examined, which match very closely the excellent description rendered by Blake, have been obtained in northernmost Perú (cf. specimens cited below). Indeed, the species was apparently first collected by Humboldt, presumably in either Colombia or northernmost Perú during his travels to that region during 1801-1802. His collection was given the provisional (unpublished) name *Perymenium rosmarini-folium* by Schultz-Bipontinus, who apparently received his material from the Humboldt herbarium (P). There is a fragment of this collection at US (presumably gathered by Blake himself) and a photograph of the Berlin plant examined by Schultz at NY!). I did not find specimens of this plant in the Humboldt Herbarium (IOC microfiche!). In any case I have mapped the species as occurring only in the Department of Piura, Perú until such time that undoubtable material is obtained from Colombia.

Shrublets or shrubs to 1.5 cm high. Stems brownish, strigose with upwardly appressed hairs. Larger leaves 4-8 cm long, 0.3-0.9 cm wide; petioles 2-5 mm

long; blades linear-lanceolate, bicolored, pinnately nervate, the lower surfaces tufted-pubescent with curly white hairs, the major veins with stouter straight appressed hairs, the margins mostly incurved, appearing entire. Heads 3-30, arranged in terminal cymes, the ultimate peduncles mostly 1-3 cm long. Involucres campanulate, 6-10 mm high, 6-10 mm across (pressed), 3-4 seriate, strictly appressed, graduate, pubescent with minutely appressed hairs, the apices obtuse to rounded, eciliate. Ray florets mostly 8-13, the ligules yellow, 10-15 mm long, 2-3 mm wide. Disk florets 20-40, the corollas yellow, 4-5 mm long, glabrous, the tube ca. 1 mm long. Anther appendages yellow, eglandular. Ray achenes 3-sided, wingless, ca. 3 mm long, the pappus of 10-15 bristles 1.0-1.5 mm long; disk achenes radially compressed, wingless, ca. 3 mm long, the pappus of 10-15 bristles 1-2 mm long.

DISTRIBUTION AND ECOLOGY (Figure 3): Northernmost Perú, District of Piura, ca. 2300 m; September.

ADDITIONAL SPECIMENS EXAMINED: PERU. Piura: Prov. Huanabamba, vicinity of Sapalache, ca. 2300 m, 4 Sep 1976, *Sagástegui A. 8602* (F, NY, TEX).

Because of its linear, pinnately-veined leaves this is a very distinct taxon, not likely to be confused with another. It is probably most closely related to *Perymenium featherstonei*, possessing the leaf-vestiture of that species.

EXCLUDED SPECIES

Perymenium klattii B.L. Rob. & Greenm., Proc. Amer. Acad. Arts 34:525. 1899. = *Steiractinia klattii* (B.L. Rob. & Greenm.) S.F. Blake, Contr. U.S. Natl. Herb. n.s. 52:49. 1917.

ACKNOWLEDGMENTS

This study is based upon the examination of 129 herbarium specimens from the following institutions (numbers examined shown in parentheses). I am grateful to the Directors concerned for the loan: F (38), GH (14), LL (2), MO (18), TEX (3), US (54). Guy Nesom provided the Latin diagnoses, and both he and T.P. Ramamoorthy reviewed the manuscript.

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**ERIGERON MAYOENSIS (ASTERACEAE: ASTEREA), A NEW SPECIES
FROM NORTHWESTERN MEXICO**

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ABSTRACT

A new species, *Erigeron mayoensis*, is described from three collections from southern Sonora and immediately adjacent Chihuahua, México, in the Río Mayo area east of San Bernardo. It is most closely related to *E. wislizeni* and *E. griseus* (sect. *Polyactis*) but differs from both in its combination of persistent, bicolored basal leaves, phyllaries with scarious margins, fewer ray flowers, and pappus reduced to a minute ring of squamellate teeth less than 0.05 mm high.

KEY WORDS: *Erigeron*, *Astereae*, *Asteraceae*, Río Mayo, México

A new species of *Erigeron* sect. *Polyactis* has recently been recognized from southern Sonora (Nesom 1993), and in a review of peripheral elements of the *E. wislizeni* (A. Gray) E. Greene complex, another group of populations from the same general area appears to be best treated as a separate species. The center of diversity for sect. *Polyactis* is in the mountains of northwestern México (Nesom 1989), where both of these recently recognized species occur. Both are from the Río Mayo area.

***Erigeron mayoensis* Nesom, sp. nov.** TYPE: MEXICO. Sonora: Cerro Saguarivo [or Sahuaribo], E of San Bernardo, along stream, 1500 m, 7-8 Aug 1935, F.W. Pennell 19609 (HOLOTYPE: US!; Isotype: PH!).

Erigeronti wislizeni (A. Gray) E. Greene ac *E. griseo* (Greenm.) Nesom similis sed ab utroque foliis basilibus persistentibus interdum bicoloribusque, phyllariis latioribus marginibus scariosis, floribus radii paucioribus, et pappo annulus minutus dentium squamellatorum ca. 0.05 mm altorum differt.

Perennial herbs from fibrous roots. Stems single from the base, 10-27 cm tall, unbranched or with 1-3 branches on the lower third, moderately strigose with closely appressed to ascending hairs 0.1-0.4 mm long, more densely so below the heads, eglandular. Leaves short-strigose with closely appressed hairs 0.1-0.3 mm long, eglandular, the basal persistent in a rosette, sometimes purplish beneath, green above, obovate, 2-5 cm long, 5-13 mm wide at widest portion, with 1-2 pairs of large, rounded, shallow teeth near the apex, the cauline similar in color but the purple not so strongly developed, oblanceolate to linear-oblanceolate, not clasping, entire or few-toothed, the largest near midstem where 10-27 mm long, 1-4 mm wide, slightly diminished in size above that but continuing relatively unreduced until immediately beneath the heads. Heads 7-9 mm wide, solitary; phyllaries oblong-lanceolate to broadly oblanceolate, in 3-4 nearly equal series, 4-5 mm long, 1.0-1.5 mm wide, at least the inner with distinctly scarious margins, sparsely pilose-hirsute, with a few minute glands; receptacle essentially smooth, apparently not alveolate. Ray flowers 32-58 in 1(-2) series, the corollas white to lavender, 10-13 mm long, the ligules 1.0-1.3 mm wide. Disc corollas 1.8-2.1 mm long. Achenes 1.7-1.8 mm long, sparsely strigose, 2-ribbed; pappus a barely perceptible ring of tiny squamellate teeth or scales less than 0.05 mm high.

Additional collection examined: MEXICO. Sonora: Sahuaribo waterfall vicinity, 2 km N of Sahuaribo on road to Curohui, 27°21' N, 108°40' W, pine-oak woodland, 1400-1500 m, 20-21 Aug 1992, *Martin et al. s.n.* (ARIZ). Chihuahua: ca. 5 m E of La Lobera along road from La Lobera to pass above Chinipas, 27°18' N, 108°35' W, with *Quercus coccolobifolia*, *Q. arizonica*, and *Pinus herrerae*, ca. 5500 ft, 19 Mar 1992, *Fishbein 208* (TEX).

The Pennell and Martin collections apparently are from the same or nearly the same locality; the collection by Fishbein ("above Chinipas") is separated by less than 20 kilometers from the other two, barely within the limits of Chihuahua. The location of all three is northeast of Alamos and east to east-northeast of San Bernardo. The plants occur in pine-oak woodlands at ca. 5000-5500 feet elevation.

In an earlier study (Nesom 1989), I identified Pennell's collection (the type of *Erigeron mayoensis*) as *E. wislizeni*, but with the two recent gatherings, it is clear that these plants can be recognized apart from the larger complex as a discrete element. It might be treated as a variety, but given the significant amount of variation already admitted and still remaining within *E. wislizeni*, *E. mayoensis* is justifiably segregated as a separate species, narrowly endemic along the western periphery of the larger geographic range of *E. wislizeni* (see Nesom 1989, Map 7). *Erigeron griseus* is also closely related to *E. wislizeni*, but the latter two species are widely separated in geography and the morphological distinctions previously noted for them (Nesom 1989) remain valid. Some of the features of *E. mayoensis* are more similar to *E. griseus* than to *E. wislizeni*, but the nature of the evolutionary inter-relationship among these three species

is obscure.

Erigeron mayoensis is similar to *E. wislizeni* and *E. griseus* in its fibrous-rooted habit, perennial duration, simple or few-branched stems, non-clasping cauline leaves, reduced pappus (lacking bristles), and ray corollas that vary in color from white to blue or lavender. It differs from both species in basal leaves that are persistent (vs. early deciduous) and sometimes bicolored (vs. green on both surfaces), fewer ray flowers (32-58 vs. 115-180 in *E. wislizeni* and 40-230 in *E. griseus*), and its pappus, a ring of squamellate teeth less than 0.05 mm high (*E. wislizeni* has a laciniate-margined corona or series of basally fused scales 0.2-0.5 mm high; *E. griseus* has merely a smooth-margined, cartilaginous rim). The new species differs further from *E. wislizeni* in its smooth or punctate receptacles (vs. alveolate) and phyllaries with thin-scarious margins (vs. thick-margined), although *E. mayoensis* and *E. griseus* are similar in these features.

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LECTOTYPIFICATION OF *SENECIO NEOMEXICANUS* A. GRAY

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ABSTRACT

Senecio neomezicanus A. Gray is lectotypified.

KEY WORDS: *Senecio*, Asteraceae

The name *Senecio neomezicanus* A. Gray was first proposed in 1883 without description. Gray, nevertheless, noted that the name was "given to a troublesome species, collected in New Mexico by Wright, Thurber, Henry, Greene, etc., in Arizona recently by Lemmon and Pringle, and within the borders of California by Parish, specimens of which have been variously and dubiously referred to *S. fendleri*, *multilobatus*, *aureus*, etc." Gray subsequently formally described the species, noting in his protologue that it occurred in "Mountains and wooded hills of New Mexico, Fendler, Wright, Thurber, Henry, Greene, etc. Arizona, Lemmon, Pringle. San Bernardino, mountains, California, Parish."

Barkley (1978) listed as the "holotype" of *Senecio neomezicanus*, as Wright 1415 (GH) from the Organ Mountains of New Mexico, collected in 1852. He presumably followed Greenman (1915) in this designation, although the latter worker did not formally designate the sheet concerned as "holotype," but rather noted this to be a "type," sheets of which could be found at both GH and PH. In view of this ambiguity, designation of a formal lectotype is needed, which is the purpose of the present paper.

Gray did not originally annotate Wright 1415 (GH) as *Senecio neomezicanus*, but rather noted on the original label that this was *Senecio aureus* L. var. *borealis* A. Gray, and subsequently stating "verging towards a stout and floccose form of var. *Balsamitae* (*S. plattensis* Nutt.)" (Gray 1852, p. 100). Later, Gray apparently wrote on the label which accompanies Wright 1415, "positus *S. Neomezicanus*." Indeed, the plant concerned (cf. Greenman 1918, pl. 4) does not fit well Gray's description of *S. neomezicanus*, looking instead like (or approaching) *S. plattensis*, if not what I would call *S. thurberi* A. Gray.

Among the various paratypes available at GH!, a better selection for lectotypification of *Senecio neomexicanus* is *Lemmon 49* from the Santa Catalina Mountains, Arizona, which is annotated "*S. Neo-Mexicanus* n-sp." in Gray's hand.

Senecio neomexicanus A. Gray, *Syn. Fl. N. Amer.* 1(2):392. 1884. TYPE: U.S.A. Arizona: Pima Co., Santa Catalina Mountains, Apr 1880, *J.G. Lemmon 49* (LECTOTYPE [selected here]: GH!). On the type sheet there is mounted *Lemmon 122*, from Ft. Lowell, Arizona; the plant is virtually identical with *Lemmon 49*, and both occur within the range of the species. Barkley annotated both specimens as belonging to his concept of *S. neomexicanus* var. *neomexicanus*.

My interpretation of what Gray had in mind when he described *Senecio neomexicanus* is essentially that of Barkley's *S. neomexicanus* var. *neomexicanus*, except that Barkley (1978) included as a questionable synonym the earliest name within this complex, *S. thurberi* A. Gray. I believe that the latter name does not belong within the *S. neomexicanus* complex, but rather applies to what Barkley calls *Senecio tridenticulatus* Rydb. (including much of his *S. neomexicanus* var. *mutabilis* [E. Greene] T.M. Barkley, which is typified by material from Colorado). In short, I consider *Senecio tridenticulatus*, *S. neomexicanus* var. *mutabilis*, *S. neomexicanus* var. *metcalfei* (E. Greene) T.M. Barkley, and *S. neomexicanus* var. *toumeyii* (E. Greene) T.M. Barkley to be synonymous with *S. thurberi*.

Preliminary field studies during the spring and summer of 1993 in southwestern New Mexico and Arizona, along with examination of most of the types concerned, suggest that *Senecio neomexicanus* var. *neomexicanus* ranges across most of southern Arizona and adjacent southeastern New Mexico; *Senecio thurberi* ranges across much of northern Arizona, closely adjacent Utah, Colorado, and most of New Mexico and trans-Pecos Texas.

Whether or not my taxonomic views with respect to the above are sound, the lectotypification provided here for *Senecio neomexicanus* appears appropriate and needed if future workers hope to stabilize the nomenclature among members of the *S. neomexicanus* - *S. thurberi* complex.

ACKNOWLEDGMENTS

My considerable thanks to Ted Barkley and Guy Nesom for reviewing this paper.

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NEW RECORDS OF ANGIOSPERMS FROM SOUTHERN NEW MEXICO

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ABSTRACT

New records for New Mexico are reported for fifteen angiosperms.

KEY WORDS: New Mexico, angiosperms, range extensions

The relatively wet spring of 1993, and collecting activities particularly by McIntosh in little-collected parts of southern New Mexico very near the Arizona border, have resulted in fifteen records for New Mexico not reported in Martin & Hutchins (1980, 1981) or Spellenberg *et al.* (1986). A number of the collections come from within a few meters of the Arizona state line. Even though the New Mexico records represent eastward range extensions of several km or more from known points in southeastern Arizona, several of the species were observed in Arizona in the vicinity of the New Mexico collections.

ASTERACEAE

Brickellia amplexicaulis B. Robins. New Mexico. Hidalgo Co: ca. 1/4 mi. E of center of Sec. 33, T31S, R18W, elev, 5550 feet [Animas Mts.]; perennial forb scattered on 10° S-facing very rocky rhyolitic slope, 1 Oct 1992, McIntosh 2444 (NMC).

Comment: First record for New Mexico, a ca. 60 km eastward range extension from known populations in southeastern Arizona for a species previously known from southern Arizona and northern México.

Brickellia coulteri A. Gray. New Mexico. Hidalgo Co: NWNW Sec. 24, T27S, R21W, Antelope Pass, Peloncillo Mountains, elev. 4600 feet. Two foot straggling shrub common under slight overhang of volcanic tuff rock on a southern exposure, 1 Apr 1993, *McIntosh 2613* (NMC).

Comment: First record for New Mexico, a range extension of ca. 15 km from Graham Co., Arizona, where the species is known from the Peloncillo Mts., 20 mi. E of Safford, Arizona (*McGuire 4/11/35* [ARIZ]). The species also closely approaches New Mexico in El Paso Co., Texas (*Worthington 9219* [ARIZ,UTEP]).

Coreopsis californica (Nutt.) Sharsmith var. *newberryi* (A. Gray) E.B. Smith. New Mexico. Hidalgo Co: sec. 6, T18S, R21W, a few feet east of the Arizona state line near the Carlisle Mine road approx. 6 air miles NW of Virden, New Mexico, elev. 4190 feet. Soil was loamy, gravelly "river breaks" type on level to gentle southeast-facing slopes, 30 Mar 1993, *McIntosh 2559* (NMC).

Comment: First record for New Mexico, a range extension of ca. 60 km from Graham Co., Arizona. Only one plant was seen. Smith (1984) notes all collections to be from Arizona.

Hypochaeris radicata L. New Mexico. Hidalgo Co: Animas, by a fence at high school football field, elev. 1342 m, 28 May 1992, *McIntosh 2056* (NMC).

Comment: First record for New Mexico for this European plant. Neither Kearney *et al.* (1960) nor Correll & Johnston (1970) list the species for their respective floras, although the species is now known from Texas (Johnston 1990).

Melampodium strigosum Stuessy. New Mexico. Hidalgo Co: Peloncillo Mts., Coronado Natl. Forest, in upper Clanton Draw along Forest Road 63, 0.4 rd. mi. NE of crest over mts, (NW1/4 sec. 24, T32S, R22W), 5700 ft. elev., 20 Sep 1986, *Worthington 15104* (NMC,UTEP); SWNW sec. 33, T31S, R18W, on E side of Animas Mountains, elev. 5680 feet. Common annual on 10° NE-facing gravelly rhyolitic slope; most common in level gravelly pockets with a little soil development, 3 Sep 1992, *McIntosh 2280* (NMC).

Comment: First report for New Mexico, a range extension of ca. 60 km from known populations in the Chiricahua Mts. of southeastern Arizona (Stuessy 1972, map, p. 52). The species is widespread in México, and also occurs in western Texas.

Pentzia incana (Thunb.) O. Kuntze. New Mexico. Doña Ana Co: 43 air km NNE of Las Cruces on the west side of the San Andres Mts., near Ropes Spring, 1730 m elev., 10 May 1993, *Brouillet & Miller 93-293* (MT,NMC); same locality, 15 May 1993, *Brouillet, Spellenberg, & Miller* (BRIT,GH,K, MEXU,MO,MT,NMC,NY,TEX,UC,UNM).

Comment: First record for New Mexico for this South African species. According to Kearney *et al.* (1960) the species was planted by the U.S. Soil Conservation Service near Safford, Graham Co., Arizona, where it was reported as tending to seed itself. The New Mexico plants occupy an area of perhaps 150 m² in an area of past disturbance on a rounded ridge that is part of a dissected outwash fan. There had been considerable activity in the area associated with White Sands Missile Range, probably in the early 1950's, but the site is rarely visited now. The largest plants had many stems, and were up to about 3 dm tall and 5-6 dm in diameter; size classes in the population suggest occasional successful establishment of seedlings. An extensive search of the area revealed no other plants of this species, nor has it been collected in rather extensive floristic surveys of the Missile Range during the past 5 years.

BORAGINACEAE

Cryptantha nevadensis Nels. & Kenn. New Mexico. Grant Co: 2 mi. NE of Red Rock on gravelly mesa slopes, *Gutierrezia* dominant, *Maguire et al. s.n.* (ARIZ); SE sec. 33, T17S, R21W, approx. 6 air miles north of Virden, elev. 4400 feet, 15 Apr 1993, *McIntosh & Brouillet 2641* (NMC); Hidalgo Co: sec. 6, T18S, R21W, ca. 6 air miles NW of Virden on the road leading to Carlisle Mine, several yards E of the state line, elev. 4190 feet, occasional, 30 Mar 1993, *McIntosh 2560* (NMC); 15 Apr 1993, *McIntosh & Brouillet 2636* (NMC).

Comment: First record for New Mexico, a range extension of a few km from adjacent Arizona. The early record appears to have been overlooked in the preparation of the Arizona Flora (Kearney & Peebles 1960).

BRASSICACEAE

Caulanthus lasiophyllus (Hook. & Arn.) Payson. New Mexico. Hidalgo Co: Sec. 6, T18S, R21W, approx. 6 air miles northwest of Virden on the road leading to Carlisle Mine, several yards E of the state line, elev. 4190 feet. Plants scattered on very gently southeast-facing loamy gravelly slope, 15 Apr 1993, *McIntosh & Brouillet 2635* (NMC).

Comment: First record for New Mexico, a range extension of ca. 70 km from near Thatcher, Graham Co., Arizona. The species is widespread in western North America.

Coronopus didymus (L.) I.E. Smith. New Mexico. Doña Ana Co: Las Cruces, E side of Locust Street between Calle de Sueños and Foster Rd., crack in sidewalk, 19 Apr 1992, *McIntosh 1949* (NMC).

Comment: First record for New Mexico for this widespread plant of eastern North America. Correll & Johnston (1970) report it for eastern and southern Texas.

CARYOPHYLLACEAE

Stellaria nitens Nutt. New Mexico. Grant Co: SWSE sec. 33, T17S, R21W, about 6 air miles north of Virden, elev. 4400 feet. NW-facing 10° rhyolitic slope, 30 March 1993, *McIntosh 2578* (NMC).

Comment: First record for New Mexico, a southeastward range extension of ca. 140 km from near Coolidge Dam, Graham Co., Arizona. We assure the botanical community that we have it right this time (see Madroño 28:87, 1981, for "first record;" Madroño 38:301, for retraction).

PAPAVERACEAE

Papaver rhoeas L. New Mexico. Hidalgo Co: immediately east of the Arizona border west of Virden, on highway shoulder, elev. 3750', 11 Jun 1992, *McIntosh 2123* (NMC).

Comment: First record for New Mexico for this Eurasian plant that is now widespread in North America.

POLYGONACEAE

Chorizanthe brevicornu Torrey. New Mexico. Hidalgo Co: Sec. 6, T18S, R21W, a few feet east of the Arizona state line near the Carlisle Mine road ca. 6 air miles NW of Virden, elev. 4190 feet, loamy, gravelly "river breaks" on level to gentle southeast-facing slopes, plants scattered, 30 Mar 1993, *McIntosh 2564* (NMC).

Comment: First record for New Mexico, a range extension of ca. 90 km from near Ft. Thomas, Graham Co., Arizona. The species is widespread in the deserts of Arizona, California, and Nevada.

Eriogonum capillare Small. New Mexico. Hidalgo Co: NWNW sec. 8, T18S, R20W, ca. 6 mi. NE of Virden, elev. 4560 feet, common on gravelly basaltic andesite dike with *Acacia greggii*, *Quercus turbinella*, *Acacia constricta*, *Mimosa biuncifera*, 11 Aug 1992, *McIntosh et al. 2193* (NMC); T18S, R20W, corner secs. 5,6,7,8, 2.5 mi. S of Steeple Rock, dark andesite with *Acacia greggii*, *Juniperus monosperma*, *Eriogonum wrightii*, *Aristida*, 11 Aug 1992, *Sivinski et al. 1946* (UNM).

Comment: First report for New Mexico, a range extension of ca. 160 km to the SE from Peridot, Graham Co., Arizona. Reveal (1976) considers the plant to be rare. There were thousands of plants at the New Mexico site. Although label information is slightly different, both collections come from the same site at the same time.

Eriogonum maculatum Heller. New Mexico. Hidalgo Co: sec. 6, T18S, R21W, ca. 6 air miles NW of Virden on the road leading to Carlisle Mine, several yards east of the state line, elev. 4190 feet. Plants scattered in annual understory of mostly *Bromus rubens*, 15 Apr 1993, *McIntosh & Brouillet 2632* (BRIT,MT,NMC,NY,UNM).

Comment: First record for New Mexico, a range extension of ca. 90 km from near Ft. Thomas, Graham Co: Arizona. The species is widespread in the western United States.

SCROPHULARIACEAE

Castilleja exserta Heller, Chuang, & Heckard subsp. *exserta*. New Mexico. Hidalgo Co: SENW sec. 14, T23S, R21W, between Lordsburg Playa and Peloncillo Mts., elev. 4300 ft., common in localized area on loamy, gravelly, nearly level soil near pipeline, 14 Apr 1993, *McIntosh 2619* (NMC).

Comment: First record for New Mexico, a range extension of ca. 90 km from near Ft. Thomas, Graham Co., Arizona. The species, until recently known as *Orthocarpus purpurascens* Chuang & Heckard 1991), is widespread in Arizona, California, and Baja California.

ACKNOWLEDGMENTS

We thank Les Landrum (ASU), Phil Jenkins (ARIZ), and Tim Lowrey (UNM) for checking their herbaria for records of these species. John Strother (UC) checked the identification of the *Pentzia*, and Ron Hartman (RM) confirmed our identification of the *Stellaria*. Guy Nesom and Don Pinkava kindly reviewed the manuscript. The Bureau of Land Management, Las Cruces District, facilitated publication by affording page charges, for which the authors are grateful.

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NEW SPECIES AND COMBINATIONS IN *NERISYRENIA* (BRASSICACEAE) OF MEXICO

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ABSTRACT

A new species of *Nerisyrenia*, *N. baconiana* B.L. Turner, is described from the Sierra de la Paila of Coahuila, México. The taxon is confined to gypseous soils and was previously included within Bacon's concept of *N. linearifolia* (S. Wats.) E. Greene var. *linearifolia*. Additionally, *N. linearifolia* var. *mezicana* Bacon is elevated to specific rank, *N. mexicana* (Bacon) B.L. Turner. Three species are now recognized within Bacon's 1978 concept of *Nerisyrenia linearifolia*: *N. linearifolia*, now confined to the U.S.A.; *N. mexicana*, relatively widespread in the Mexican states of Coahuila, Nuevo León, closely adjacent Tamaulipas, and San Luis Potosí; and *N. baconiana*, a localized gypseous endemic seemingly confined to the Sierra de la Paila, Coahuila.

KEY WORDS: Brassicaceae, *Nerisyrenia*, México

Bacon (1978) provided an excellent systematic account of the genus *Nerisyrenia*, recognizing nine species, only one of which, *N. linearifolia*, was treated as having infraspecific units. *Nerisyrenia linearifolia* has come under close scrutiny by the present author during his numerous forays into northern México since Bacon's study. Because of this I have little hesitation in proposing the following novelties and nomenclatural changes.

Nerisyrenia baconiana B.L. Turner, *sp. nov.*, Figure 1. TYPE: MEXICO. Coahuila: Sierra de la Paila, SW quadrant, Canyon Carrera (= Canyon Corazón del Toro of older maps), northern exposed gypsum slopes of Cerro Alto in desert grassland, 1450-1750 m, 26 Jul 1993, *Thomas F. Patterson 7263*, with Karen Clary & B.L. Turner (HOLOTYPE: TEX!; Isotypes: ENCB, GH, MEXU, NY).

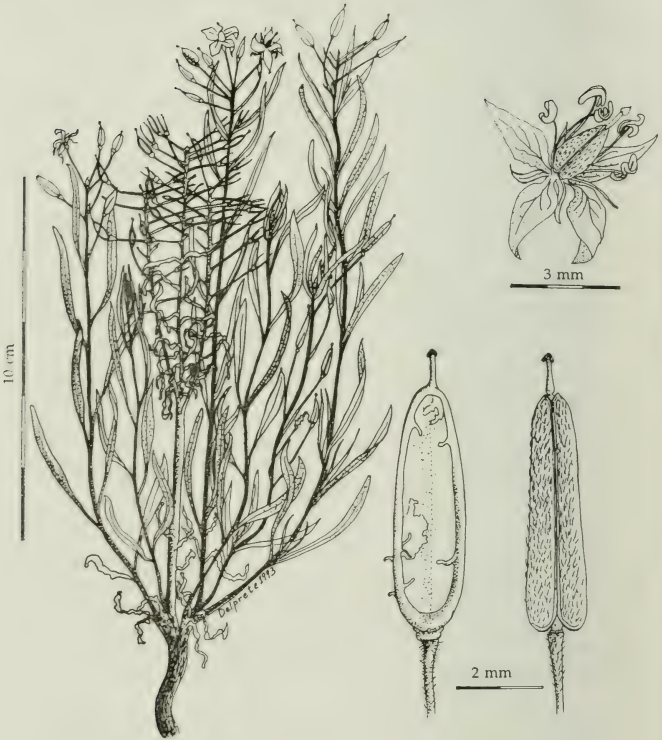


Figure 1. *Nerisyrenia baconiana*, from the holotype.

Nerisyrenia linearifolia (S. Wats.) E. Greene var. *linearifolia* similis sed plantis radice palari (vs. rhizomatosis), foliis magis uniformiter angustioribus (plerumque 1-2 mm latis vs. 2-6 mm), et siliculis brevioribus angustioribus obcompressisque (plerumque 6-8 mm longis vs. 10-30 mm) differt.

Suffruticose tap-rooted stiffly erect perennial herbs or shrublets 20-30 cm high. Stems brown, pubescent with appressed mostly dendritic hairs. Leaves linear to linear-ob lanceolate, ascending, mostly 2-4(-5) cm long, 1-2(-3) mm wide, finely strigose with mostly dendritic hairs. Inflorescence terminal, racemose, 1-3 cm long, 10-20 flowers per stem, the pedicels mostly 5-10 mm long in flower, up to 20 mm long in fruit. Sepals green to lavender, lanceolate, 4-5 mm long; petals white to lavender-white, broadly lanceolate, 6-8 mm long, 1.5-2.0 mm wide, the indistinct claw ca. 2 mm long. Stamens 2.0-3.5 mm long. Ovary with styles 1.5-2.0 mm long, stigma bifid. Siliques mostly 6-8 mm long, 1.5-3.0 mm wide, linear to linear-elliptic, obcompressed, minutely pubescent; seeds (immature) 8-16 per carpel, brown, ca. 0.75 mm long, ca. 0.50 mm wide.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Coahuila: Sierra de la Paila, upper reaches of Cañon Corazón del Toro at Mina la Abundancia and above on one of the peaks, "calcareous gravel or almost pure crumbly gypsum" (25°54'30" N, 101°38'00" W), 1900-2100 m, 5 Nov 1972, *Wendt et al. 1011a* (LL); near the same locality, 1725 m, 6 Nov 1972, *Chiang et al. 10118* (LL); near the same locality, 1750 m, 31 Mar 1973, *Johnston et al. 10510* (LL).

This species is known from only four collections, all from within a 5 km radius. So far as known it is confined to gypseous outcrops along the middle and lower slopes of the Cerros Prietos (one of these shown on some maps as Cerro Alto). The holotype itself was obtained from the lower northern slopes of Cerro Alto, about a 1.5 km walk southeast across an *Agave lechugilla* flat from the primitive road which passes along this protuberance. The remaining collections were obtained from a more accessible site ca. 4 km NE of the type locality, where the plant occurs near some abandoned fluorite mines (M.C. Johnston, pers. comm.).

Bacon (1978) included this taxon (with considerable reservation, as noted below) in his concept of *Nerisyrenia linearifolia* (S. Wats.) E. Greene var. *linearifolia*. It differs from the latter in being a tap-rooted perennial (vs. rhizomatous) with more uniformly, narrowly linear leaves (mostly 1-2 mm wide vs. 2-6 mm wide), smaller flowers (petals mostly 6-8 mm long, vs. ca. 13 mm), and shorter narrow obcompressed pods (mostly 6-8 mm long vs. 10-30 mm). Bacon also recognized a Mexican variety of *N. linearifolia*, var. *mexicana* Bacon, which he surmised (1978, p. 218) "on further study, may prove to be worthy of specific status." Indeed, with description of the present taxon, and considering the remoteness of both *N. linearifolia* var. *mexicana* and *N. baconiana* from populations of *N. linearifolia* var. *linearifolia*, I have

little hesitation in elevating *N. mexicana* to specific rank, as follows:

Nerisyrenia mexicana (Bacon) B.L. Turner, *comb. & stat. nov.* BA-
SYNONYM: *Nerisyrenia linearifolia* (S. Wats.) E. Greene *var. mexicana*
Bacon, *Rhodora* 80:216. 1978.

Nerisyrenia mexicana is readily distinguished from both *N. linearifolia* and *N. baconiana* by its low sprawling habit, the stems branching mostly from the very base, and by its thicker more arcuate siliques.

I have named the present species in honor of John D. Bacon, an "academic son" of mine who obtained his Ph.D. at the University of Texas in 1975 and is currently Professor of Biology at the University of Texas, Arlington. He worked on *Nerisyrenia* for his doctoral thesis and clearly called to the fore the novelty described here, as noted in the above. Except for the collections from México described here as new, all of the specimens accepted by Bacon as *N. linearifolia* *var. linearifolia* are confined to the U.S.A. (Texas and New México).

ACKNOWLEDGMENTS

I am grateful to Guy Nesom for the Latin diagnosis and to him and John Bacon for reviewing the paper. I should also thank my field companions Tom Patterson and Karen Clary who traipsed through about 3 miles of *Agave lechugilla* so as to gather type material of *Nerisyrenia baconiana*.

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MISCELLANEOUS NOTES ON NEOTROPICAL FLORA XXI. A NEW SPECIES
OF *HUMIRIASTRUM* FROM BRAZIL

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ABSTRACT

A new species, *Humiriastrum mussunungense* from Reserva Forestal, CVRD, E. Santo, Brazil is described. A key for the Brazilian *Humiriastrum* species is given.

KEY WORDS: Humiriaceae, *Humiriastrum*, Brazil

In the process of working over many collections recently received for identification from Brazil an interesting, undescribed species of the Humiriaceae has been detected, which description is here provided.

Humiriastrum mussunungense Cuatrecasas, *sp. nov.* TYPUS: BRAZIL. Reserva Forestal da CVRD. Esp. Santo, Linhares, Final da Est. Bomba d'Água, ant 213, proxima ao pântano. Em Floresta de Mussununga. Arbore ± 15 m alt., fuste ± 5 m, DAP 27.1 cm ϕ da copa ± 8 m. Flor creme e botão verde claro, col 27 Aug. 1991, D.A. Folli 1393 HOLOTYPUS (flores): US.

Same locality, but near Est. Flamengo, Arbore em Floresta Mussununga, 13 m alt, fuste 4 m, DAP 23.2 cm, ϕ da copa ± 6 cm. Com fruto imaturo verde escuro. Fuste cilíndrico e cascara aspera, 25 Mar. 1991, D.A. Folli 1299 Paratypus (typus fructi): US.

Arbor ad 15 m alta. Rami foliosi hornotini glaberrimi, ceteri rami ramusculique plus minusve angulati, glabri tuberculato-lenticellati.

Folia chartacea breviter petiolata simplicia alterna glaberrima Lamina 7-11 \times 3.5-5.5 cm, laete viridis, elliptica vel obovato-elliptica

utrinque attenuata, apice breviter acuminata, basi subobtusula interdum cuneata, margine serrato-crenata; adaxialiter laevis nitidula costa plana, nervatio leviter impressa; abaxialiter costa pallida prominula deorsum bi-quadrifida striataque, nervis secundariis prominulis 8-9 utroque latere subascendentibus prope marginem curvato anastomosatis, nervis tertiis et minoribus reticulum laxum prominulum formantibus. Petiolus crassiusculus adaxialiter planus 3-10 mm longus.

Inflorescentiae axillares folia valde breviores, 3-4 cm longa. Pedunculus circa basim articulatus, 2-3 cm longus, erectus, tenuis sed rigidus, striolatus minute hirtulus ad apicem paniculam cymosomonochasiale ferens. Panicula congesta breviter ramosa, 1.5-2.0 cm expansa, ramusculis 2 mm longis, bracteolis brevissimis ovatis 0.5-1.0 mm mox deciduis, pedicellis ad 1 mm longis. Ramuli pedicelli bractee omnes hirtuli pilis minutissimis acutis albis patulis muniti.

Alabastra oblonga ad 4 mm longa viridi-albida, sparse hirtula. Sepala 5, viridia suborbicularia 1.2-1.8 mm longa, 1.2-2.0 mm lata, margine hyalina albicantia minute ciliata, abaxialiter deorsum sparsis minutis pilis. Petala praefloratione quincuncialia, membranacea albida elliptico-oblonga subacuta, $3.5-4.0 \times 1.3-1.8$ mm, sursum sparse hirtula reliqua glabra. Stamina 20 glabra, filamentis complanatis anguste triangularibus distaliter acute filiformibus, basim in tubum (1.0-1.5 mm alt) coalitis, 5 longioribus 3 mm longis, 15 brevioribus 2.5-2.0 mm longis. Antherae circa 1 mm, connectivo anguste triangulari acutiusculo albicanti erecto proximaliter crassiusculo, ad basim 2 sacci polliniferi globoso-elliptici nitidi albi muniti. Discus tubularis 1.2-1.5 mm altus margine argute acuteque denticulatus glaber ovarium cingens. Ovarium oblongo-ovatum vel obovatum glaberrimum 1.4-1.5 mm longum. Stylus crassiusculus 0.8-1.1 mm longus glaber erectus cum stigmata capitata 5-lobata coronatus.

Fructus drupaceus $3.6-4.2 \times 3.0-3.5$ cm subgloboso-ellipsoideus glaber sublaevis viridi-brunnescens, exocarpio coriaceo ± 5 mm crasso, endocarpio lignoso resinoso-lacunoso superficie granulosa, 39×32 mm, valvis obscure notatis ± 21 mm longis. Seminum unicum.

Humiriastrum mussunungense is apparently close to *H. colombianum* Cuatr. from which it differs by its larger blades with conspicuous prominent secondary veins and venular reticle beneath, by the glabrous ovary and by the size of the fruit. It also differs from *H. glaziovii* (Urban) Cuatr. because of its larger leaves, by the hirtellous branching of the inflorescences and the larger

fruits.

Humiriastrum mussunungense appears to have the largest size of fruit recorded for the genus. The fruit of the specimen being somewhat damaged by parasites could not be clearly defined.

KEY FOR THE BRAZILIAN HUMIRIASTRUM SPECIES

A - Bracts persistent.

B - Terminal branchlets hirsute. Leaves villous or hirsute at least on the midrib. *H. villosum* (Froes) Cuatr.

B' - Terminal branchlets glabrous, rarely puberulous. Leaves glabrous.

C - Leaf-lamina ovate-oblong, elongate, thick-coriaceous, narrowed-acuminate. Fruit ellipsoid, 2.5-3.4 × 2.0-2.3 cm. Sepals puberulous. Ovary puberulous. *H. piraparanense* Cuatr.

C' - Leaf-lamina ovate or elliptic, acuminate or cuspidate. Fruit globose 1.0-1.7 cm diam. (in var. shortly ellipsoid). Sepals glabrous. Ovary glabrous. .. *H. cuspidatum* (Bentham) Cuatr.

A' - Bracts deciduous.

D - Leaf-lamina coriaceous, rigid, obovate or elliptic-obovate, rounded at apex, the margins entire. Petiole 6-8 mm, lamina 3.5-6.5 × 2.0-4.2 cm. *H. spiritu-sancti* Cuatr.

D' - Leaf-lamina attenuate at apex: acute, acuminate or cuspidate, the margins ± crenate-dentate.

E - Terminal branchlets hirsute or hirtellous.

F - Leaf-lamina abaxially pubescent or puberulous, the midrib densely pubescent adaxially, 4-11 × 1.5-5.0 cm. Petiole 7-10 mm, hirtellous. *H. dentatum* (Casaretto) Cuatr.

F' - Leaf-lamina glabrous throughout, 2.5-9.0 × 1.5-5.0 cm. Petiole 2-3 mm. *H. excelsum* (Ducke) Cuatr.

E' - Terminal branchlets glabrous.

G - Branching of inflorescences hirtellous. Fruit ellipsoid, 3.6-4.2 × 3.0-3.5 cm. Leaf-lamina 7-11 × 3.5-5.5 cm.
..... *H. mussunungense* Cuatr.

G' - Branching of inflorescences glabrous. Fruit globose or ellipsoid-globose, 1.9-2.2 cm diam. Leaf-lamina 3.5-10.0 × 1.5-5.0 cm. *H. glaziovii* (Urban) Cuatr.

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NEW SPECIES AND COMBINATIONS IN *SELINOCARPUS*
(NYCTAGINACEAE)

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ABSTRACT

A new species of *Selinocarpus*, *S. maloneanus* B.L. Turner, is described from the Malone Mountains of trans-Pecos, Texas, and *S. lanceolatus* Wooton var. *megaphyllus* Fowler & B.L. Turner is elevated to specific rank as *S. megaphyllus* (Fowler & B.L. Turner) B.L. Turner, *stat. and comb. nov.* These along with *S. lanceolatus* are closely related gypsophiles but appear not to intergrade, and each appears confined to its own geographic region. A key to distinguish among these is provided, along with a map showing their distributions.

KEY WORDS: *Selinocarpus*, Nyctaginaceae, México

Selinocarpus is a small genus of suffruticose herbs or shrubs mostly confined to xeric habitats of the southwestern U.S.A. and closely adjacent México. Nearly all of the species occur on gypseous soils. A taxonomic treatment of the genus was rendered by Fowler & Turner (1977) in which nine species were recognized, eight of these occurring in North America, one confined to northeastern Africa. The present paper adds two additional species to the genus, both of these gypsophiles.

Selinocarpus maloneanus B.L. Turner, *sp. nov.* TYPE: U.S.A. Texas: Hudspeth Co., gypsum quarry, N end of Malone Mts., near Finley, 29 Jul 1958, *D.S. Correll & I.M. Johnston 20358* (HOLOTYPE: LL!).

Selinocarpo lanceolato Wooton similis sed differt foliis late ovatis 1.5-2.0-plo longioribus quam latioribusque prope medium latissimis apicibus abrupte mucronulatis (vs. lanceolatis 2-4-plo longioribus quam latioribusque probe basim latissimis apicibus obtusis vel acutis non mucronulatis).

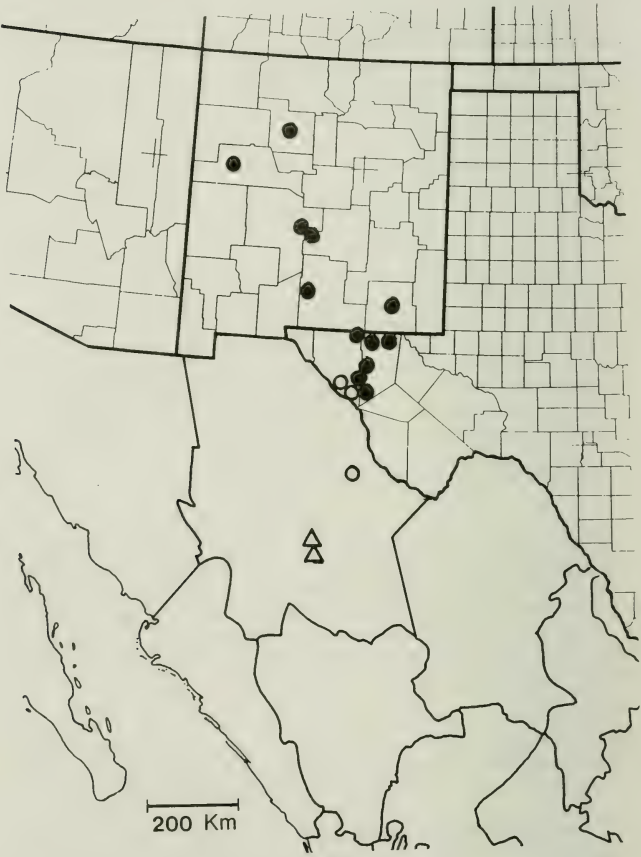


Figure 1. Distribution of *Selinocarpus lanceolatus* (closed circle); *S. maloneanus* (open circle); and *S. megaphyllus* (triangle).

Erect suffruticose herbs 15-30 cm high. Stems ashy white, minutely pubescent with short white flattened trichomes, arising from a ligneous, or woody, tap root. Midstem leaves mostly broadly ovate to ovate-elliptic, weakly 3-nervate, succulent, 2.6-3.0 cm long, 1.3-1.8 cm wide, 1.5-2.0 times as long as wide; petioles 2-3 mm long, the blades abruptly "greenish" or "pale yellow," abruptly terminated with a distinct mucronation. Corollas reportedly ca. 35-38 mm long, the tube ca. 30 mm long, narrowly tubular, ca. 1 mm wide throughout, the throat funnellform, abruptly flaring from the tube, ca. 12 mm across at anthesis. Anthocarps (including the wings) rectangular in outline, 6-7 mm long, 5-8 mm wide, the wings 2-4 mm wide.

ADDITIONAL SPECIMENS EXAMINED: U.S.A. Texas: Hudspeth Co., gypsum flat, SE base of Malone Mts., 5 Jul 1958, *Correll & Johnston 19298* (LL); ca. 10 mi W of Sierra Blanca at the SW end of the Malone Mts., along Interstate Hwy 10, 13 Aug 1974, *Spellenberg & Syversten 3744* (LL).

MEXICO. Chihuahua: Mpio. Aldama, large gyp flat, 8.8 mi E on a dirt road from Hwy 16 where it crosses the railroad (SW of Coyame), 26 May 1971, *Powell 2116*, with B. Fowler (TEX).

Fowler & Turner (1977) did not have access to the type materials cited above, although other less well preserved collections from the Malone Mountains were available. All of these were referred to *Selinocarpus lanceolatus* Wooton var. *lanceolatus*. The Mexican collection, cited above, was not mentioned by Fowler & Turner, but these clearly belong to what is here recognized as *S. maloneanus*.

Selinocarpus maloneanus is readily distinguished from *S. lanceolatus* by its broadly ovate to ovate-elliptic leaves which are broadest near the middle, the blades mostly 1.5 to 2.0 times as long as wide (vs. consistently lanceolate, broadest near the base, the blades mostly 2-4 times as long as wide). Both of these taxa appear closely related to *Selinocarpus megaphyllus*. The latter is readily distinguished by its much larger, broadly ovate to rotund leaves which are scarcely longer than broad (cf. Figure 2 in Fowler & Turner 1977). In addition, *S. megaphyllus* has a much larger creamy white perianth 35-40 mm long, the throat gradually flaring and ca. 25 mm across at anthesis (cf. *Johnston et al. 12343*, LL, not examined in our original study). An artificial key to these several taxa is provided below:

1. Leaves lanceolate, mostly 2-4 times as long as wide, the apices obtuse to acute; U.S.A. *S. lanceolatus*
1. Leaves broadly ovate to rounded, mostly 1-2 times as long as wide, the apices abruptly acuminate or apiculate, (México and Malone Mts., U.S.A., Texas).

2. Leaves 1.5-2.0 times as long as wide; perianth greenish to yellowish, 3.0-3.5 cm long, the throat abruptly flaring. *S. maloneanus*
2. Leaves 1.0-1.5 times as long as wide; perianth creamy white, 3.5-4.0 cm long, the throat gradually flaring. *S. megaphyllus*

Selinocarpus megaphyllus (Fowler & B.L. Turner) B.L. Turner, *stat. & comb. nov.* BASIONYM: *Selinocarpus lanceolatus* Wooton var. *megaphyllus* Fowler & B.L. Turner, *Phytologia* 37:183. 1977.

When originally described, this taxon was known to its authors only by type material (Chihuahua: gypsum soils ca. 15 mi SW of Estación Moreón along the road to Río Conchos). A single (unicate) subsequent collection has been made by *M.C. Johnston et al. 12343* (Mina Las Playas, 1 km S of Mina Cerro Prieto on road to Julimes, ca. 31 km by winding road N of Julimes, ca. 1300 m, "gyp anhydrite gypsum," 25 Aug 1973, LL).

ACKNOWLEDGMENTS

I am grateful to Guy Nesom for the Latin diagnosis and to him and Piero Delprete for reviewing the paper.

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**MORPHOLOGICAL VARIATIONS IN *PINUS PRAETERMISSA* (PINACEAE)
FROM DURANGO, MEXICO**

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ABSTRACT

Pinus praetermissa Styles & McVaugh is recorded for the first time from a locality in the Mexican state of Durango. Collected specimens showed different morphological features from the original description of the species.

KEY WORDS: *Pinus*, Pinaceae, Durango, México, taxonomy

RESUMEN

Se registra por primera vez una localidad de *Pinus praetermissa* Styles & McVaugh para el estado de Durango. Se presentan individuos con características morfológicas diferentes a la descripción original de la especie.

PALABRAS CLAVE: *Pinus*, Pinaceae, Durango, México, taxonomía

Shaw (1909) described *Pinus oocarpa* Schiede var. *microphylla* Shaw from two locations in México: Colomas, Sinaloa, *Rose 1755* and Pedro Paulo to San Blasato, Tepic, *Palmer*, 1948. He stated that cones are different from *P. oocarpa* and needles are much shorter and narrower than the typical variety. Martínez (1948) recognized *Pinus oocarpa* var. *microphylla* in his work on Mexican pines, although he considered a difficult task to set aside this variety from *P. oocarpa* without a better examination of the leaves, because the cones are very similar to each other.

Styles & McVaugh (1990), based on mature cone differences including the direction and distribution of scales as well as rows of stomata on the outer face of the leaf, discussed the differences between the *oocarpa* group and the *pseudostrobus* complex.

Leaf anatomy, as regards to resiniferous ducts, showed differences with the *oocarpa* variety and consequently, they decided to name a new taxon: *Pinus praetermissa*. Perry (1991) showed a distribution map of *Pinus oocarpa* var. *microphylla* with localities in southeastern Sinaloa, southern Zacatecas, southern Nayarit, and central and northwestern Jalisco (Figure 1).

From recent botanical exploration in southern Durango, I discovered a small population of *Pinus praetermissa* from Taxicaringa, Municipio de El Mezquital. The general area is characterized by rough and steep slopes, locally known as Region de las Quebradas (canyon region). This population was located at an elevation of 1780 m, on the limits of the settlement. Vegetation is highly modified due to human productive activities, however some isolated arboreal elements coming from higher elevations can be recognized, such as *Pinus maximinoi* H.E. Moore and *Quercus magnolifolia* Née, as well as shrubs typical of tropical deciduous forest such as some cacti and legumes. Family orchards showed fruits trees including guava, avocado, and banana, as an indication of tropical climate.

Mean height of *Pinus praetermissa* is 8 m. Trees are growing in shallow soils. They have abundant foliage which is often consumed by livestock, especially goats. The *Pinus praetermissa* collection was made at Taxicaringa, Municipio de El Mezquital, Durango on March 18th, 1993, A. García & J. Necedal 1767 (CIIDIR and Instituto de Ecología).

As a result of leaf analysis, sheaths with five, six, seven and, in a few cases, eight needles were found. In contrast, only five needled fascicles had previously been recorded. With regard to the number of resiniferous ducts, they were the same as recorded in the original description: one or two internal ducts.

The specimens from Durango present some variations on the cone parameters. Mature cones have strongly curved, reflexed scales toward the base of the cone, showing a very different aspect as compared to typical for the species. Cone length recorded for the collected specimens is as much as 8.8 cm, whereas Styles & McVaugh (1990) reported cones from (4.5-)5.5-7.0 cm. Peduncle thickness is as much as 6 mm, whereas the authors mentioned above recorded thickness of 3-4 mm. This information suggests that recently collected specimens might represent a new taxon, however it is important to collect from different populations that might show more evidence to confirm this possibility.

This new locality increases the species range northwards. There are chances of finding more populations in southern Durango since locations such as this are common and most of them are not yet explored because of their inaccessibility.

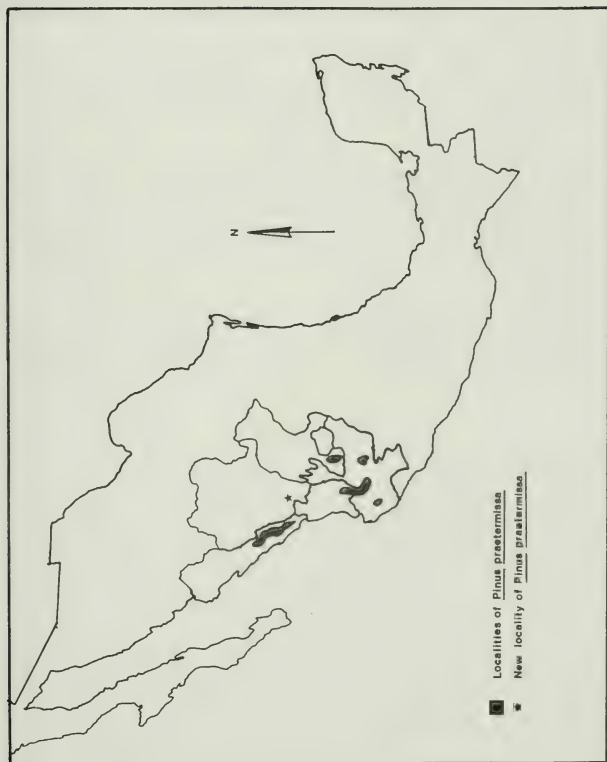


Figure 1. Geographical distribution of *Pinus praetermissa* in western México (from Perry 1991).

ACKNOWLEDGMENTS

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FLORISTICS OF A BOG IN VERNON PARISH, LOUISIANA, WITH COMMENTS ON NOTEWORTHY BOG PLANTS IN WESTERN LOUISIANA

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ABSTRACT

The floristics, species richness, and soil characteristics of a west Louisiana bog are described and compared with other bogs in the area. Noteworthy vascular plants found in bogs in western Louisiana are also discussed.

KEY WORDS: Bog, pitcher plant, hillside seepage bog, Louisiana, floristics, *Sarracenia*, Kisatchie National Forest

INTRODUCTION

In previous papers we have described the floristics of eleven west Louisiana pitcher plants bogs (a.k.a., hillside seepage bogs) (MacRoberts & MacRoberts 1988, 1990a, 1991, 1992). In the present paper we describe the floristic composition, soil conditions, and species richness of one pitcher plant bog located on the Vernon Ranger District of the Kisatchie National Forest, Louisiana, about 50 km south of the other bogs we have studied.

The main reason we undertook this study was to determine if bogs south of our main study area were richer in species composition. They would be expected to be according to biogeographic theory because the bogs we had studied previously are at the northern extreme of the range for this habitat; whereas those in Vernon Parish are in the middle of the range for western Louisiana and eastern Texas (Allen *et al.* 1988; Withers 1980; Nixon & Ward 1986; Bridges & Orzell 1989a, 1989b; Olson 1992).

Since we are also engaged in locating and mapping bogs in the Kisatchie and Vernon Ranger districts, we report briefly on bog species not found at our main study site and on rare and interesting species occurring in this plant community. The bogs of western Louisiana and eastern Texas are isolated from

the main body of bog habitat in the southeastern United States by not only the Mississippi River, but by approximately 250 km of intervening habitat of other types, and they have been so for a long time.

STUDY SITE

Cooter's Bog (a.k.a., Bog 32-4) is located about 11 km NE of Pitkin, Louisiana, in T1N R5W S28. It covers approximately 3.2 ha. Although technically a hillside seepage bog, Cooter's bog has about a 2 percent slope and looks very like the savannah bogs of southeastern Louisiana. It is open with only a few scattered longleaf pines and a few low-growing shrubs, mainly *Magnolia virginica*. At its northwestern corner the bog surrounds a small baygall (see Guillory *et al.* 1990 for a description of baygall habitat). Running through the center of Cooter's Bog is a stream with typical riparian vegetation; this we excluded from our inventory.

In presettlement times Cooter's Bog was embedded in the vast upland longleaf pine forest that stretched across the gulf coastal plain, with only a single disjunction, into west Louisiana and east Texas (Mohr 1897; Smith 1991). Today, longleaf is still the dominant pine in the area.

Cooter's Bog has been burned regularly — usually in the nongrowing season but also in the early summer (Olson 1992). It was burned the winter before our study. *Sphagnum* is a dominant ground cover in only a few sections of the bog where it sometimes forms deep mats, notably in the northwestern section immediately surrounding the baygall thicket.

The climate of Vernon Parish is fundamentally identical to that of the other Louisiana parishes in which we have studied bogs. Summers are hot and humid with temperatures regularly at or above 35°C; mean annual rainfall is about 135 cm, and is fairly evenly distributed throughout the year (Withers 1980).

METHODS

We visited Cooter's Bog at two-week intervals from March through November 1992. Voucher specimens for many of the species were collected. Rare or easily identified plants were not collected. We follow MacRoberts (1984, 1989) and Allen (1992) for scientific nomenclature. Soil samples were taken from the upper 15 cm of the bog and were analyzed by A&L Agricultural Laboratories, Memphis, Tennessee.

As an additional means of measuring species richness, we established two one meter square plots and one twenty-five meter square plot, and recorded species in them every two weeks.

Table 1. Soil characteristics of Cooter's Bog.

		Exchangeable ions (ppm)				
Site	pH	P	K	Ca	Mg	OM%
B1	4.7	3	18	110	28	3.8
B2	4.8	3	14	50	17	3.8
W1	4.6	4	11	70	21	1.7

RESULTS

Table 1 gives soil information for Cooter's Bog. The three samples come from three widely separated and different areas of the bog: B1 and B2 consisted of black sandy soils; W1 was white sandy soil. Table 2 lists the species found in Cooter's Bog.

DISCUSSION

The soil at Cooter's Bog is similar to the soils of bogs we have previously studied. It is described as Ruston fine sandy loam occurring on 1 to 3 percent slopes. It is low in organic matter, acidic, and nutrient poor.

Of the twelve bogs we have inventoried, Cooter's has by far the most species. We found 135 taxa representing 88 genera and 45 families. This is an increase of approximately twenty percent over any bog previously studied. This increase in species richness is reflected also in the sample plots: at Cooter's Bog the 25 meter square plot had 36 species and the two one meter square plots had 26 and 27 species. Species counts made in other years at bogs in the Kisatchie Ranger District 50 km to the north gave between 14 and 22 species (average 18) for ten one meter square plots, and 32 and 33 species for two 25 meter square plots (MacRoberts & MacRoberts 1991).

Cooter's Bog also appears to be richer than bogs in east Texas. Nixon & Ward (1986) report between 88 and 118 species for six bogs but do not give their sizes. Cooter's Bog is however, floristically the same community as the east Texas bogs; while Nixon & Ward do not provide a total list of species for these six sites, they list the 48 species with a presence value greater than 80%. Cooter's Bog has 90% of these.

We have not calculated the Index of Similarity (IS) for each bog pair we have studied, but by combining the eleven Natchitoches Parish bogs and using a presence value of greater than 25% (i.e., present in at least three of the eleven bogs) the IS between Cooter's Bog and the Natchitoches Parish bogs is 77. Clearly, they represent the same plant community.

In a previous paper (MacRoberts & MacRoberts 1992) we described the relationship between bog size and species richness among bogs in Natchitoches

Table 2. Cooter's Bog Species

BLECHNACEAE — *Woodwardia virginica* (L.) Sm.

LYCOPODIACEAE — *Lycopodium alopecuroides* L., *L. appressum* (Chapm.) Lloyd & Underw., *L. carolinianum* L.

OSMUNDACEAE — *Osmunda cinnamomea* L., *O. regalis* L.

PINACEAE — *Pinus palustris* P. Mill.

AMARYLLIDACEAE — *Hypoxis rigida* Chapm.

BURMANNIACEAE — *Burmannia capitata* (Walt.) Mart.

CYPERACEAE — *Carex glaucescens* Ell., *Eleocharis tuberosa* (Michx.) Roem. & Schult., *Fuirena squarrosa* Michx., *Rhynchospora chalarocephala* Fern. & Gale, *R. elliottii* A. Dietr., *R. globularis* (Chapm.) Small, *R. glomerata* (L.) Vahl., *R. gracilentia* A. Gray, *R. inezpansa* (Michx.) Vahl, *R. latifolia* (Baldw.) Thomas, *R. macra* (C.B. Clark) Small, *R. oligantha* A. Gray, *R. plumosa* Ell., *R. rariflora* (Michx.) Ell., *Scleria reticularis* Michx.

ERIOCAULACEAE — *Eriocaulon decangulare* L., *E. texense* Körn., *Lachnocaulon anceps* (Walt.) Morong., *L. digynum* Körn.

IRIDACEAE — *Sisyrinchium atlanticum* Bickn.

JUNCACEAE — *Juncus debilis* A. Gray, *J. marginatus* Rostk., *J. scirpoides* Lam., *J. trigonocarpus* Steud.

LILIACEAE — *Aletris aurea* Walt., *Melanthium virginicum* L., *Schoenolirion croceum* (Michx.) Wood, *Smilax laurifolia* L., *Zigadenus densus* (Desr.) Fern.

ORCHIDACEAE — *Calopogon tuberosus* (L.) B.S.P., *Platanthera ciliaris* (L.) Lindl., *Pogonia ophioglossoides* (L.) Juss., *Spiranthes longilabris* Lindl., *S. vernalis* Engelm. & Gray.

POACEAE — *Anthaenantia rufa* (Ell.) Schultes, *Aristida purpurascens* Poir. var. *virgata* (Trin.) Allred, *Ctenium aromaticum* (Walt.) Wood., *Dicanthelium acuminatum* (Sw.) Gould & Clark, *D. dichotomum* (L.) Gould *ensifolium* (Baldw.) Gould & Clark, *Eragrostis spectabilis* (Pursh) Steud., *Erianthus giganteus* (Walt.) Muhl., *Muhlenbergia expansa* (Poir.) Trin., *Panicum rigidulum* Bosc ex Nees, *Panicum tenerum* Bey. ex Trin., *Panicum virgatum* L., *Paspalum plicatulum* Michx., *Paspalum setaceum* Michx., *Schizachyrium scoparium* (Michx.) Nash, *S. tenerum* Nees, *Tridens ambiguus* (Ell.) Schultes.

Table 2 (continued).

XYRIDACEAE — *Xyris ambigua* Bey. ex Kunth, *X. baldwiniana* Schultes, *X. caroliniana* Walt., *X. difformis* Chapm. var. *curtissii* (Malme) Kral, *X. drummondii* Malme, *X. louisianica* Bridges & Orzell, *X. scabrifolia* Harper, *X. torta* Smith.

ACERACEAE — *Acer rubrum* L.

ANACARDIACEAE — *Toxicodendron vernix* (L.) Kuntze.

APIACEAE — *Centella asiatica* (L.) Urban, *Eryngium integrifolium* Walt., *Ozypolis filiformis* (Walt.) Britt., *O. rigidior* (L.) Raf., *Ptilimnium capillaceum* (Michx.) Raf.

AQUIFOLIACEAE — *Ilex coriacea* (Pursh) Chapm.

ASCLEPIADACEAE — *Asclepias longifolia* Michx., *A. rubra* L.

ASTERACEAE — *Aster dumosus* L., *A. sericocarpoides* (Small) K. Schum., *Bidens aristosa* (Michx.) Britt., *Boltonia diffusa* Ell., *Cacalia ovata* Walt., *Chaptalia tomentosa* Vent., *Coreopsis linifolia* Nutt., *C. tripteris* L., *Erigeron vernus* (L.) Torrey & Gray, *Eupatorium leucolepis* (DC.) Torrey & Gray, *Eupatorium rotundifolium* L., *Helenium drummondii* H. Rock, *Helianthus angustifolius* L., *Liatris acidota* Engelm. & Gray, *L. pycnostachya* Michx., *Marshallia graminifolia* (Walt.) Small ssp. *tenuifolia* (Raf.) S. Watson, *Pluchea foetida* (L.) DC., *Solidago patula* Muhl.

BETULACEAE — *Alnus serrulata* (Ait.) Willd.

CAMPANULACEAE — *Lobelia reverchonii* B.L. Turner.

CAPRIFOLIACEAE — *Viburnum nudum* L.

CLUSIACEAE — *Hypericum brachyphyllum* (Spach.) Steud., *H. cruz-andreae* (L.) Crantz, *H. setosum* L.

DROSERACEAE — *Drosera brevifolia* Pursh, *D. capillaris* Poir.

ERICACEAE — *Vaccinium corymbosum* L.

FABACEAE — *Tephrosia onobrychoides* Nutt.

GENTIANACEAE — *Bartonia paniculata* (Michx.) Muhl., *Sabatia gentianoides* Ell., *S. macrophylla* Hook

HALORAGIDACEAE — *Myriophyllum aquaticum* (Vell. Conc.) Verdc.

LAMIACEAE — *Hyptis alata* (Raf.) Shinnars, *Scutellaria integrifolia* L.

Table 2 (continued).

LAURACEAE — *Persea borbonia* (L.) Spreng.

LENTIBULARIACEAE — *Pinguicula pumila* Michx., *Utricularia cornuta* Michx., *U. juncea* Vahl., *U. subulata* L.

LINACEAE — *Linum medium* (Planch.) Britt.

LOGANIACEAE — *Cynoctonum sessilifolium* (Walt.) St. Hil.

MAGNOLIACEAE — *Magnolia virginiana* L.

MELASTOMATACEAE — *Rhexia lutea* Walt., *R. mariana* L., *R. petiolata* Walt.

MYRICACEAE — *Myrica cerifera* L., *M. heterophylla* Raf.

NYSSACEAE — *Nyssa sylvatica* Marsh.

ONAGRACEAE — *Ludwigia hirtella* Raf.

POLYGALACEAE — *Polygala cruciata* L., *P. mariana* P. Mill, *P. ramosa* Ell.

ROSACEAE — *Aronia arbutifolia* (L.) Pers.

RUBIACEAE — *Hedyotis boscii* DC.

SARRACENIACEAE — *Sarracenia alata* Wood.

SCROPHULARIACEAE — *Agalinis* sp., *Gratiola pilosa* Michx.

VIOLACEAE — *Viola primulifolia* L.

Table 3. Species found in other bogs of the Vernon Ranger District.

<i>Asclepias lanceolata</i> Walt.
<i>Calopogon barbatus</i> (Walt.) Ames
<i>Lyonia ligustrina</i> (L.) DC.
<i>Platanthera blephariglottis</i> (Willd.) Lindl.
<i>Platanthera cristata</i> (Michx.) Lindl.
<i>Platanthera integra</i> (Nutt.) Gray ex Beck
<i>Platanthera nivea</i> (Nutt.) Spreng.
<i>Pluchea rosea</i> Godfrey
<i>Rhododendron canescens</i> (Michx.) Sw.
<i>Rhododendron oblongifolium</i> (Small) Millais
<i>Rhexia alifanus</i> Walt.
<i>Rudbeckia scabrifolia</i> Brown
<i>Scleria georgiana</i> Core
<i>Solidago rugosa</i> Ait.
<i>Stylisma aquatica</i> (Walt.) Raf.
<i>Viola lanceolata</i> L.

Parish. There is a strong positive correlation between size and number of species present. Cooter's Bog is larger than the other bogs we have studied and it has more species and so fits the area/richness prediction of island biogeography. Richness at Cooter's Bog may be due also to its central location in optimal bog habitat, and to the fact that it is within the range of a number of southern species whose range does not extend much farther north, for example, *Schoenolirion croceum*, *Eriocaulon texense*, *Erigeron vernus*, and *Sabatia macrophylla*.

Bog species found in previous studies but not found at Cooter's Bog are listed in Table 3.

In this section we comment on a few of the more interesting species found in both Kisatchie and Vernon District bogs (voucher specimens for almost all species we have collected in Louisiana bogs are preserved in the Vanderbilt University Herbarium). The information presented here includes both data gathered by Annette Parker, former U.S.D.A. Forest Service Botanist, Vernon Ranger District, Leesville, Louisiana, on bogs on the Vernon District in 1990 and our data on Vernon District and Fort Polk bogs gathered since 1991 (a combined total of 266 bogs surveyed), our data for 155 bogs in the Kisatchie District and 15 bogs adjacent to Forest Service land surveyed since 1987, and our floristic inventory done in 1987 and 1988 of one Winn District bog (notes on file, Kisatchie Ranger District, Natchitoches, Louisiana; Vernon Ranger

District, Leesville Louisiana; Supervisor's Office, Pineville, Louisiana; see also MacRoberts & MacRoberts 1988, 1990a, 1991, 1992; Bridges & Orzell 1989b). The combined sample consists of 437 bogs.

Combining our data with those of Parker gives 305 documented locations for state and federally listed rare, threatened, and endangered bog species. In our area are *Calopogon barbatus*, *Lachnocaulon digynum*, *Lycopodium cernuum*, *Platanthera blephariglottis*, *P. integra*, *Rhynchospora macra*, *Rudbeckia scabrifolia*, *Sabatia macrophylla*, *Xyris drummondii*, *X. scabrifolia*, and *Zigadenus densus*. We also comment on a few species that have not received federal or state recognition. Data collected after June 6, 1993 are not presented here.

Calopogon barbatus is not common in the west gulf coastal plain and has only been found at a few locations. We know of only three sites for it on the Vernon District and one in the Kisatchie District.

Eriocaulon texense, once thought to be uncommon in western Louisiana, has been found in the majority of bogs in the Vernon District where it sometimes forms an almost continuous ground cover. We have never found this species in the Kisatchie District just 30 km north.

We have found *Eriogonum vernus* in two bogs on the Vernon District, apparently the most western point of its range.

Lachnocaulon digynum is an interesting species; it has been found in slightly over 50 bogs on the Vernon District and adjacent Fort Polk and in one bog on the Winn District (MacRoberts 1989) but has never been found on the intervening Kisatchie District.

Lycopodium cernuum was found in Middle Branch Bog (Kisatchie Ranger District) in the late 1970's and early 1980's but has not been found there since, although looked for (MacRoberts & MacRoberts 1988); we have not seen it in any bogs in west Louisiana and east Texas. As it is a conspicuous and easily recognizable species, it is likely that *L. cernuum* will prove to be very rare in the west gulf coastal plain.

Platanthera blephariglottis was first found in western Louisiana as a single stem in a bog on the Vernon Ranger District in August 1990. In September 1992 the site was revisited and three stems were found at two locations in this bog. While identification has not been given the imprimatur of an expert because there are too few stems to warrant collecting, consistently white flowers distinguish these plants from *P. ciliaris* (which is common in this bog).

Until recently, *Platanthera integra* was considered very rare in western Louisiana and east Texas (MacRoberts & MacRoberts 1990b; Orzell 1990) and it remains uncommon; we have found it in nine Kisatchie District bogs, often in large numbers, and since 1989 it has been found in twelve Vernon District bogs.

We have found *Rhynchospora chalarocephala* in two bogs on the Kisatchie District and in one bog on the Vernon District. However, because this species is not easily distinguished in the field, it is probably far more common than

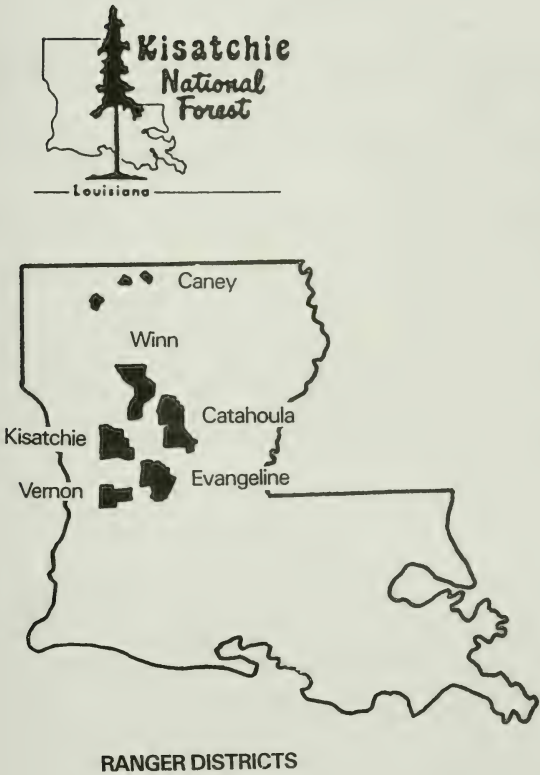


Figure 1. Locations of Ranger Districts in the Kisatchie National Forest.

these numbers indicate (Orzell & Bridges 1989b).

Until recently, *Rhynchospora macra* was thought to be rare in western Louisiana, having been reported from only one bog, but it has now been documented for 28 bogs on the Kisatchie and Vernon districts. Where it occurs – in very wet areas – it is usually abundant.

Rudbeckia scabrifolia, a west gulf coastal plain endemic not described until 1986 (Brown 1986), is often abundant, forming dense stands in bogs and along the bog-baygall ecotone. It is known from 50 bogs on the Vernon District but apparently does not extend north into Natchitoches Parish.

Sabatia macrophylla is known from 48 Vernon District and Fort Polk bogs, where it can be abundant; like *Rudbeckia scabrifolia* it does not extend north into Natchitoches Parish.

Both *Xyris drummondii* and *X. scabrifolia* can be abundant in west Louisiana bogs; the former is known from 74 and the latter from 16 locations on the Kisatchie and Vernon districts.

We have found *Zigadenus densus* in fifteen bogs in the Vernon District and adjacent Fort Polk; it is common in western Louisiana and eastern Texas.

Due to the scarcity of plant community surveys in Louisiana (MacRoberts 1984) and in the west gulf coastal plain in general (Bridges & Orzell 1989a), as bogs and other habitats in this part of Louisiana and adjacent east Texas are more thoroughly investigated, other endemic, relict, and disjunct species should be discovered, and species once considered rare will be found to be much more common (see Bridges & Orzell 1989b; MacRoberts & MacRoberts 1990b; Kral 1983; Orzell 1990).

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for allowing us to share these data with the Forest Service and to utilize the survey results without restriction.

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THE TEXAS SPECIES OF *CENTAURIUM* (GENTIANACEAE)

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ABSTRACT

A taxonomic treatment of the Texas species of *Centaurium* is rendered. Ten species are recognized as occurring within the state: *C. arizonicum*; *C. beyrichii*; *C. breviflorum* (Shinners) B.L. Turner; *C. calycosum*; *C. glanduliferum* (Correll) B.L. Turner; *C. maryannum* B.L. Turner; *C. multicaule*; *C. nudicaule*, *C. pulchellum*, and *C. texense*. Complete synonymy, a key to species, and maps showing the geographical distribution of each in Texas and closely adjacent regions are provided, along with an illustration of the holotype of *C. maryannum*.

KEY WORDS: Gentianaceae, *Centaurium*, Texas, México

Centaurium is a taxonomically difficult genus of mostly annual and perennial herbs containing about 60 species. It occurs on nearly all continents and the species are about equally distributed among the Old and New World. Broome (1973, 1975, 1977) has rendered an excellent account of the New World species native to México and Central America, while Dunn (1967) has provided an unpublished revisionary study of the genus for the continental United States.

In Texas, the very attractive commonly encountered roadside species, *Centaurium beyrichii* and *C. calycosum*, are referred to as "pinks", although Correll & Johnston (1970) and yet others use "Centaury" as the common name for the genus as a whole. *Centaurium texense* was the first species to be described from Texas; it was collected by Thomas Drummond in 1834 somewhere between San Felipe (Austin County), Texas and Gonzales (Gonzales County), Texas, only shortly before his untimely death in Cuba in 1835 (Geiser 1957). Subsequent workers added additional taxa to the state's inventory, but no one familiar with the state's bountiful flora has attempted to treat them in detail. Correll & Johnston (1970), without recourse to the study of Broome (1970),

or apparently that of Dunn (1967) recognized only five taxa as native to the state: *C. beyrichii* var. *beyrichii*, *C. beyrichii* var. *glanduliferum*, *C. calycosum* var. *calycosum*, *C. calycosum* var. *breviflorum*, and *C. texense*. In the present treatment I recognize all of these taxa, but elevate the varieties *glanduliferum* and *breviflorum* to specific rank, and have added to the state's inventory five additional species: *C. arizonicum* (subsumed under *C. calycosum* by Correll & Johnston); *C. maryannum* (newly described); *C. multicaule* and *C. nudicaule*, both from trans-Pecos, Texas and more western regions; and *C. pulchellum*, a widespread weedy species believed to be a recent introductant into eastern Texas.

I have attempted to treat the Texas taxa as biological units having populational integrity, this based upon morphogeographical considerations. This is largely the result of many field sorties over various parts of Texas over many years, but mostly as a result of intensive field work in the spring and summer of 1993 during which the roadsides of Central Texas were adorned with billions of pinks, as noted under *Centaurium calycosum* in the treatment that follows.

I realize that the taxa which I have recognized as species might also be treated as but subspecifically or varietally distinct. As noted by Broome (1973, p. 4) "Species boundaries in *Centaurium* frequently are not marked by clear morphological discontinuities ... The more widespread species tend to form several localized morphological races and intergrading forms, and so many of the published binomials surely represent local races which were studied and named out of the context of the total variation pattern of a region ...". In Texas this appears to be the case for *Centaurium calycosum* var. *nanum* (A. Gray) B.L. Rob., which I have subsumed under *C. calycosum*, but the remaining taxa appear to be well-marked populational units worthy of specific recognition. Thus, I treat *C. arizonicum* as a species, while Broome treats it as a variety of *C. calycosum*. Field work clearly shows that the former, in Texas and elsewhere, is largely confined to semiaquatic habitats, while the latter is largely confined to dry uplands. To my knowledge they do not coexist, and they are readily distinguished. Occasional small plants of *C. arizonicum* will superficially resemble *C. calycosum*, and vice versa, this being the cause of confusing distributional maps based only upon herbarium specimens.

Much additional field and experimental work will be needed to confirm the treatment proposed here. To judge from published accounts, chromosome numbers should be helpful in resolving some of the problems, thus Broome (1973) reports $2n = 84$ for *Centaurium calycosum* from Nuevo León, México (which I take to be *C. arizonicum*), $2n = 40$ for *C. calycosum* var. *nanum* (= *C. calycosum*), and $2n = 42$ for *C. texense*, while Holt (by annotation Holt 29, SRSC) reported a count of $2n = 24$ for *C. arizonicum* from Brewster County, Texas.

In the final analysis, however, taxonomic boundaries at the specific level are best judged by experienced field workers who take the time to observe

populations in their natural settings. That is what I have tried to do in rendering the present contribution, although some of my conclusions based solely upon herbarium material are clearly inferential in nature, but even these reflect my knowledge of populational variation of characters in the field.

KEY TO TEXAS SPECIES OF *CENTAURIUM*

1. Lobes of corolla mostly 2-6(-7) mm long; anther sacs (at maturity, when coiled) 0.6-1.5 mm long.
 2. Flower pedicels mostly 3-7 cm long; plants of trans-Pecos Texas.
 3. Cauline leaves subulate to narrowly linear; capsule ovoid, 2.5-3.0 times as long as wide. *C. nudicaule*
 3. Cauline leaves variously ovate to obovate; capsule broadly fusiform in outline, 3-5 times as long as wide. . *C. multicaule*
 2. Flower pedicels mostly 1-3 cm long; plants not in trans-Pecos Texas.
 4. Corolla lobes mostly 2-4 mm long; eastern Texas. *C. pulchellum*
 4. Corolla lobes mostly 4-7 mm long; central and southern Texas.
 5. Corolla lobes mostly 4-5 mm long; anther sacs mostly 0.9-1.1 mm long; mid-stem leaves mostly linear-oblongate, 1-3 mm wide; mostly eastern Edwards Plateau and northwards. *C. texense*
 5. Corolla lobes mostly 5-6(-7) mm long; anther sacs mostly 1.4-1.6 mm long; mid-stem leaves mostly ovate, 3-8 mm wide; southern Texas. *C. breviflorum*
1. Lobes of corolla mostly (5-)6-15 mm long; anther sacs (when coiled) 1.5-2.5 mm long.
 6. Stems, leaves, and calyces invested with minute gland-like papillae, readily observable at magnifications of $\times 20-40$; trans-Pecos Texas. *C. glanduliferum*
 6. Stems, leaves, and calyces glabrous.
 7. Leaves linear-oblongate throughout, mostly 1-3 mm wide; plants robust, mostly 20-40 cm high, much-branched from the very base, and the flowers numerous and densely packed in a divaricately branched, interlocking inflorescence, the flowers confined to the upper 1/5 of the plant; central Texas to Oklahoma. *C. beyrichii*
 7. Leaves, at least those at the base, oblongate, ovate to broadly obovate, 3-12 mm wide; plants not branched as described in the above; south-central Texas westwards to Arizona.

8. Plants mostly 20-40 cm high, the stems weakly spreading, not much-branched, the flowers relatively few and borne mostly erect; plants of subaquatic habitats occurring in silty alluvial soils along streams and about ponds; trans-Pecos Texas. *C. arizonicum*
8. Plants mostly 5-20 cm high, the stems usually divaricately branched, the flowers numerous and variously spreading; plants of xeric habitats occurring in shallow calcareous soils or bare gypseous outcrops, usually along road shoulders.
 9. Plants usually with (3-)4 or more equally developed stems arising from the very base of the plant; apices of style (stigmatic area) ovoid to orbicular in outline, scarcely bifid, if at all; seeds black; gypseous soils of northern Culberson Co. and adjacent New Mexico.
..... *C. maryannum*
 9. Plants usually with 1 stem, this much-branching well above the base (rarely 2 or more through mainstem-injury, or sometimes occasional multi-stemmed plants in an otherwise largely one-stemmed population); apices of style (stigmatic area) fan-shaped in outline and up to 1.2 mm broad, or else markedly bifid; seeds brown; eastern trans-Pecos and central Texas. *C. calycosum*

Centaurium arizonicum (A. Gray) Heller, *Muhlenbergia* 4:86. 1908.

Erythraea calycosa Buckl. var. *arizonica* A. Gray, *Syn. Fl. N. Amer.* 2(1):113. 1878. *Erythraea arizonica* (A. Gray) Rydb., *Bull. Torrey Bot. Club* 33:148. 1906. *Centaurium calycosum* (Buckl.) Fernald var. *arizonicum* (A. Gray) Tidestrom, *Proc. Biol. Soc. Wash.* 48:42. 1935. TYPE: UNITED STATES. Utah: Washington Co.: St. George, 1875, *E. Palmer s.n.* (LECTOTYPE: GH!, designated here, also designated by Broome through annotation, 1979).

Dunn (1967) recognized this taxon as a species, although Broome (1973) treated it as a variety of *Centaurium calycosum*. It (*C. arizonicum*) superficially resembles *C. calycosum* but is readily distinguished by its proclivity for moist alluvial soils of stream banks, pond margins or very wet seeps. The populations are mostly quite small and localized (*i.e.*, patchy), and readily distinguished from *C. calycosum* by habit and branching patterns. As noted by Broome (1973, p. 158), the stems of *C. arizonicum* are only sparingly branched while those of *C. calycosum* form a tight numerous-flowered inflorescence; the

stems of *C. arizonicum* are only sparingly branched. Depauperate forms of *C. arizonicum* may superficially resemble sparsely branched forms of *C. calycosum*, but for the most part the two taxa are readily distinguished, especially in the field.

Centaurium beyrichii (Torrey & Gray) B.L. Rob., Proc. Amer. Acad. Arts 65:396. 1910. BASIONYM: *Erythraea beyrichii* Torrey & Gray ex Torrey in Marcy, *Expl. Red River* 291. 1853. TYPE: UNITED STATES. Arkansas Territory: w/o date or locality, *Beyrich s.n.* (HOLOTYPE: GH; Photoholotype: DUKE!). *Erythraea trichantha* Willd. var. *angustifolia* Griseb. in DC., *Prodr.* 9:60. 1845.

This species is relatively common in the Edwards Plateau region of Central Texas, often forming spectacular populations of massively flowering intricately branched individuals 20-40 cm high. It sometimes occurs near or with *Centaurium calycosum* and the occasional hybrid between these probably occurs. It is possible that what has been called *C. calycosum* var. *nanum* is a series of variable populations derived from ancestral hybridization or perhaps recent gene flow of *C. beyrichii* into the somewhat more western *C. calycosum*. Indeed, Dunn (by annotation, TEX) took some of the individuals of *C. calycosum* var. *nanum* to be hybrids of *C. arizonicum* \times *C. texense*, which is unlikely since these two taxa are not known to occur together. In any case, plants referred to var. *nanum* are essentially rather dwarfish copies of *C. beyrichii*, but the basal leaves are broader, the corollas are smaller, and the lobes mostly possess broadly acute or obtuse apices.

Centaurium breviflorum (Shinners) B.L. Turner, *stat. et comb. nov.* BASIONYM: *Centaurium calycosum* (Buckl.) Fernald var. *breviflorum* Shinners, *Field & Lab.* 18:130. 1950. TYPE: UNITED STATES. Texas: Cameron Co.: NW of Brownsville, 6 Apr 1941, *C.L. Lundell 10022* (HOLOTYPE: SMU).

Centaurium breviflorum is closely related to *C. calycosum* and *C. texense* and most workers have annotated the sheets concerned as one or the other, although Broome, by annotation, recognized four taxa from among what I recognize as *C. breviflorum* (*C. calycosum* var. *arizonicum*, *C. calycosum* var. *calycosum*, *C. calycosum* var. *nanum*, and *C. texense*). However, the several taxa are readily distinguished by the characters given in the Key to Species and each occurs in a distinctive ecogeographic setting: *C. breviflorum* in sandy or alluvial soils of southern Texas; *C. calycosum* in shallow rocky soils of the more western portions of the Edwards Plateau; and *C. texense* in rocky or calcareous seeps along the more eastern portions of the Edwards Plateau, as

discussed under the latter. Further, *C. calycosum* nearly always occurs in very large nearly continuous populations, among which small-flowered individuals may or may not occur (cf. discussion under that species), whereas *C. texense* is a relatively uncommon, but widespread taxon, usually occurring as isolated individuals, or as small patchy populations. Indeed, I have not found *C. calycosum* and *C. texense* occurring together, these being for the most part allopatric.

Centaurium calycosum (Buckl.) Fernald, *Rhodora* 10:54. 1908. BASIONYM: *Erythraea calycosa* Buckl., *Proc. Acad. Nat. Sci. Phila.* 2:7. 1862. TYPE: UNITED STATES. Texas: Mason Co.: N of Ft. Mason, *S.B. Buckley s.n.* (HOLOTYPE: PH; Photoholotype: DUKE!).

Erythraea calycosa Buckl. var. *nana* A. Gray, *Syn. Fl. N. Amer.* 2:113. 1878. *Centaurium calycosum* (Buckl.) Fernald var. *nanum* (A. Gray) B.L. Rob., *Proc. Amer. Acad. Arts* 45:395. 1910. TYPE: UNITED STATES. Texas: "Stoney hills, W. Texas", 1852, *C. Wright 1662* (LECTOTYPE: GH!, designated here; Isolectotypes: GH!, 2 sheets).

Broome (1974) recognized three varieties within this taxon: var. *arizonicum*, var. *nanum*, and var. *calycosum*. I recognize the former as a good species, but have been unable to adequately differentiate between the latter two taxa. Broome noted that the "The status of *nanum* as a variety of *C. calycosum* is greatly suspect." My own belief is that var. *nanum* has been applied to populational forms and/or individuals with generally smaller, simple-stemmed plants of var. *calycosum* having mostly narrowly oblanceolate mid-stem leaves and mostly smaller corollas with paler colors. Field observations of individuals and/or populations referable to these two names during the late spring of 1993 (during which time populations were abundant almost everywhere across the range of *Centaurium calycosum*) has led me to believe that *C. calycosum* is a heterogeneous assemblage of variable populations and is best treated as such. I have observed populations in which the majority of individuals might be referable to var. *calycosum*, and yet others in which most individuals might be referable to var. *nanum*; among both such populations, individuals occur which are variously intermediate between these two taxa, as recognized by Broome (1974). Documentation of this assessment is on file at TEX in the form of numerous vouchers with accompanying colored photographs. It is remotely possible that these two varietal names apply to two closely related sympatric species which are hybridizing, but this is not clearly discernible in the field. Alternatively, the names might apply to two intergrading, varietal taxa, but if so, their distributions are not suggestive of intergrading allopatric taxa of the usual sort.

I have discussed the possibility that the variation discussed in the above might be due to occasional or long-time hybridization between *Centaurium calycosum* and *C. beyrichii* (discussed under the latter), but this is largely speculative.

Nevertheless, as noted by Broome (1974), Dunn (1967) treated forms referable to var. *nanum* as part of "a vast polymorphic hybrid swarm between *C. calycosum* (sensu stricto) and *C. texense*." As indicated in the above, my own view is that var. *nanum* is a name applied to small-flowered forms of *Centaurium calycosum* var. *calycosum*, such flowers occurring on either robust individuals or, more frequently, on depauperate individuals, the latter usually with linear-lanceolate mid-stem leaves.

Correll & Johnston (1970) did not recognize var. *nanum* (perhaps ignorant of its existence) but they did recognize var. *breviflorum*, a seemingly distinct taxon of mostly alluvial soils in southern Texas which I have elevated to specific status. Broome (1974) treated var. *breviflorum* as a synonym of *Centaurium calycosum* var. *calycosum*, while retaining *C. texense*.

Figures 1 and 2 show the distribution of *Centaurium calycosum* as determined from specimens on deposit at LL, NMC, SRSC, and TEX. As noted in the above it is an abundant roadside weed in the more western portions of the Edwards Plateau, barely extending into adjacent México. It is replaced in the more eastern portions of the Edwards Plateau by *C. texense*, the latter having a smaller more strict habit with fewer flowers and smaller corollas. Small-flowered forms of var. *calycosum* are often confused with *C. texense*, but the latter taxon is readily distinguished by its smaller anthers and shorter corolla lobes; additionally it does not form the massive populational display shown in *C. calycosum*, rather the plants of *C. texense* are relatively uncommon along the base of limestone bluffs in seeps, especially along the eastern part of the Edwards Plateau. *Centaurium texense* also occurs sporadically in granitic or sandy soils of the Central Mineral Region of Texas.

***Centaurium glanduliferum* (Correll) B.L. Turner, comb. et stat. nov.** BAsIONYM: *Centaurium beyrichii* (Torrey & Gray) B.L. Rob. var. *glanduliferum* Correll, *Wrightia* 4:76. 1968. TYPE: UNITED STATES. Texas: Terrell Co.: 8 mi W of Sanderson, 13 Sep 1961, *Correll & Johnston* 24580 (HOLOTYPE: LL!).

This is a very distinctive taxon, having the basal foliage of *Centaurium beyrichii*, the branching habit and seeds of *C. maryannum*, and the corollas of *C. calycosum*. It differs from all of these in having a minute vestiture of papillose "glands" or gland-like enations on its leaves, stems, and calyces, readily observable at magnifications of $\times 20-40$. Initially known only by the holotype, a number of locality records have recently come to the fore, as follows: Texas:

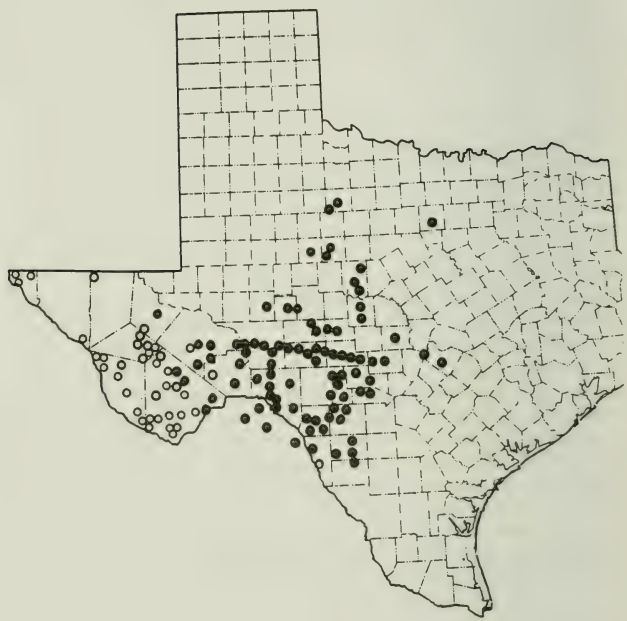


Figure 1. Distribution of *Centaurium arizonicum* (open circles) and *C. calycosum* (closed circles) in Texas.

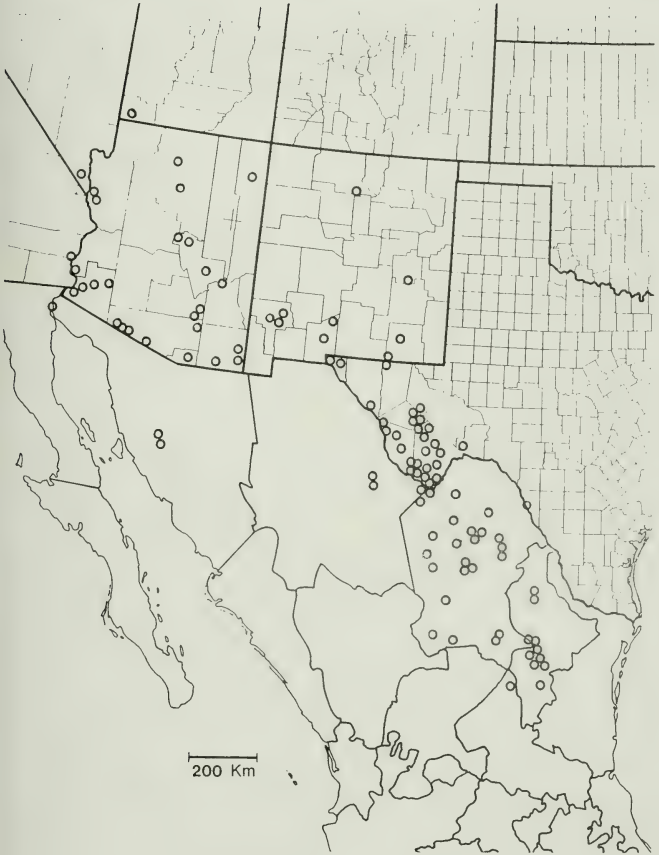


Figure 2. Distribution of *Centaurium arizonicum* in Texas and surrounding areas.

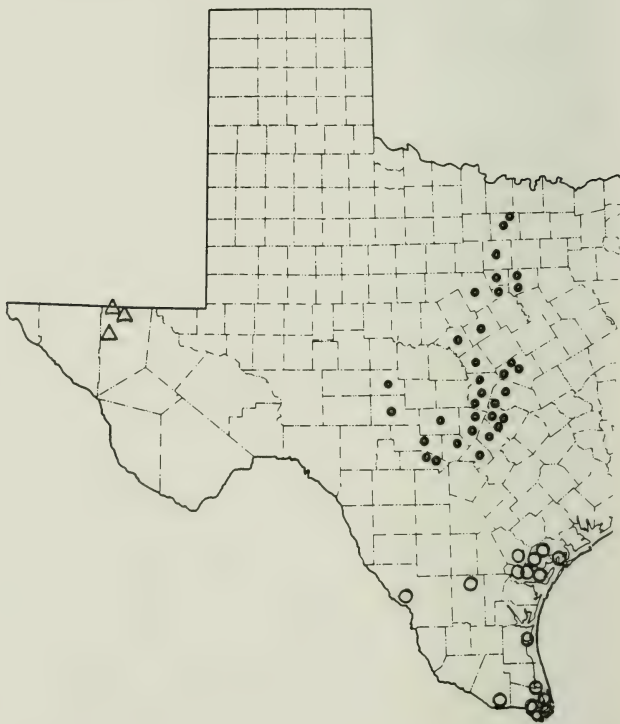


Figure 3. Distribution of *Centaureum beyrichii* (closed circles), *C. parviflorum* (open circles), and *C. maryannum* (open triangles) in Texas.

Brewster Co., Roadside hwy 285, 27.7 mi N of Sanderson, 17 Jul 1993, A.M. & S.A. Powell 5947 (SRSC,TEX); Roadside hwy 90, 22 mi E of Marathon, 17 Jul 1993, A.M. & S.A. Powell 5948 (SRSC,TEX). Pecos Co.: 40 to 45 mi SE of Ft. Stockton, 1 Jul 1955, B.H. Warnock 13427 (LL,SRSC,TEX).

Centaurium maryannum B.L. Turner, *sp. nov.* Figure 4. TYPE: UNITED STATES. Texas: Culberson Co.: ca. 2 mi E of intersection of state highways 1108 and 652, ca. 15 airline mi S of White City, New Mexico, 22 May 1967, B.L. Turner 5660 (HOLOTYPE: TEX).

Centaurio arizonico A. Gray similis sed differt habitatione solis aridis gypseis sterilibusque (vs. solis alluvialibus subaquaticis), habitu minore (plerumque 5-20 cm altis vs. 20-50 cm altis) caulibus numerosioribus coarctatis ad basim exorientibus, et partis stigmaticae angustissimae ca. 0.25 mm latae (vs. 0.5-1.0 mm latae) vulgo subcapitatae (vs. flabelliformis).

Annual glabrous herbs mostly 5-20 cm high. Stems (3-)5-30 arising from slender or thickened tap roots, rarely, if ever, with a single stem arising from the crown of the root. Midstem leaves mostly oblanceolate to linear-oblanceolate, less often narrowly elliptic, 15-25 mm long, 1.5-4.0 mm wide; basal leaves forming a persistent rosette, similar to the cauline leaves but larger (up to 5 cm long and 0.8 cm wide). Flowers numerous, arranged in rather congested cymes, the pedicels mostly 0.5-2.0 cm long. Sepals linear-lanceolate, mostly 7-10 mm long, free to the base or nearly so. Corollas pink, the tubes mostly 10-12 mm long, the slightly enlarged throat 1-2 mm long (yellowish within), the lobes mostly 6-8 mm long, 1-4 mm wide, the apices acute to broadly obtuse. Anthers yellow, 2.0-2.2 mm long after dehiscence. Styles extending somewhat beyond the exerted anthers, the swollen apex or stigmatic region weakly bilobed, if at all, essentially oval or rounded in outline, ca. 0.5 mm across. Capsules about as long as the tube, the seed numerous, subrhomboid, markedly alveolate, at maturity black, ca. 0.3-0.4 mm long. Chromosome number, $2n = 42$ (Soreng & Spellenberg 2107, NMC!).

ADDITIONAL SPECIMENS EXAMINED: New Mexico: Chaves Co.: 10 mi E of Roswell along hwy 70, gypsum soils, 13 Jun 1974, Higgins 8689 (NMC); ca. 7 mi E of Roswell along hwy 390, gypsum hills, 30 Jun 1973, Powell 2533 (LL); 19 mi S of Mesa, in "pure" gypsum, 9 Jun 1973, Turner 8023 (LL). De Baca Co.: 10-2/3 mi NE of Dunlap, 23 Jun 1942, Cory 37568 (GH); 25 mi E of junction 285-20 along hwy 20, gypsum soil, 26 Jun 1973, Higgins 7468 (NMC). Eddy Co.: S of Carlsbad near White City, 18 May 1940, Hershey 2529 (NMC); S of Carlsbad, 28 May 1942, Hershey 2687 (GH, NMC); gypsum flats ca. 30 mi NE of Carlsbad, 30 Jun 1973, Powell 2535 (LL); 10 mi SW

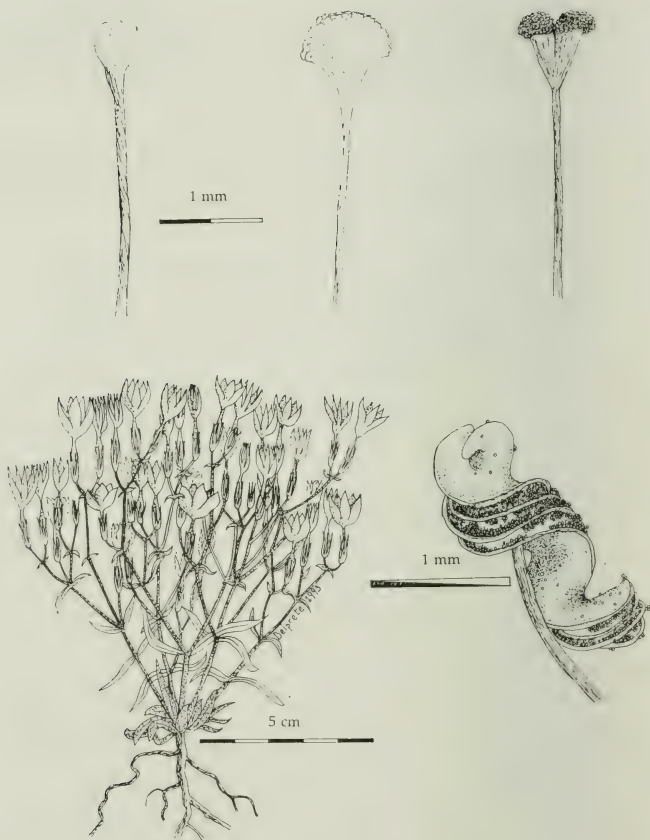


Figure 4. *Centaurium maryannum*, "Lady Langford's Centaury", from holotype. Habit, lower left; anther lower right; style branches, left to right: *C. maryannum*; *C. arizonicum*; *C. calycosum*.

of Whites City, gyp soil, 22 May 1967, *Turner 5656*; just N of Texas-N. Mex. border along hwy 180, bare gypsum ridges, 29 May 1993, *B.L. & Gayle Turner 93-8* (TEX); 7 mi S of Whites City, 10 Aug 1946, *Waterfall 6546* (GH). Otero Co.: White Sands, 25 Oct 1935, *Hershey s.n.* (NMC); White Sands, 13 mi SW of Alamogordo, interdunal flats, 1 May 1983, *Soreng & Spellenberg 2107* (NMC); gypsum sand hills at White Sands Natl. Monument, 27 Aug 1951, *Warnock 10055* (SRSC). Texas: Culberson Co.: 40 mi NE of Van Horn, gyp hills, 10 Jul 1943, *Waterfall 5000* (GH).

As noted earlier, this taxon superficially resembles *Centaurium calycosum*, an abundant highly variable species of central Texas where it occurs on predominantly shallow calcareous soils. *Centaurium maryannum* is readily distinguished from the latter by its proclivity for gypseous soils, numerous stems arising from the crown of the root, persistent basal leaves, and small, scarcely bifid, ovoid to globose styler region (ca. 0.4 mm wide, vs. flabellate and 0.8-1.5 mm wide and/or markedly cleft at the apex).

The type of *Centaurium maryannum* was annotated by D.S. Correll (who treated *Centaurium* for the *Manual of the Vascular Plants of Texas*; Correll & Johnston 1970) as *C. beyrichii*, while Broome (in connection with her study of the Mexican and Central American species) annotated it as *C. calycosum* var. *nanum*, although she annotated three of the above cited paratypes as *C. calycosum* var. *arizonicum*.

It is a pleasure to name this relatively rare species for the exceptional mother of my wife Gayle, "Lady" Mary Ann Langford-Taylor, nee Glass, who has cheerfully tolerated our many overnight visits to her home in San Angelo, Texas as we passed westward doing fieldwork. The state of Texas now has two native Centaury plants, or "pinks", with common names coined after exceptional ladies: Lady Bird's Centaury [or Pink] (cf. Correll & Johnston, p. 1207), and the present Lady Langford's Centaury.

Centaurium multicaule B.L. Rob., Proc. Amer. Acad. Arts 45:396. 1940.

TYPE: MEXICO. Chihuahua: Moist meadow, Hacienda St. Diego, 2 Jun 1891, *Hartman 717* (HOLOTYPE: GH).

This largely Mexican taxon is superficially similar to *Centaurium nudicaule* and *C. arizonicum*, possessing the general habit of the former but having corollas of the latter. Only a single collection has been seen from Texas, as follows: Presidio Co.: Infrequent on west slope of Elephant Mountain, 26 Apr 1959, *T.J. Allen 20* (SRSC). Prof. A.M. Powell of SRSC informed me that Elephant Mt. is located in the northeastern portion of Presidio County and is not to be confused with the better known Elephant Butte in Brewster County.

Broome (1979, by annotation) referred the specimen concerned to *Centaurium calycosum* var. *arizonicum* "approaching *C. multicaule*". I think the plant

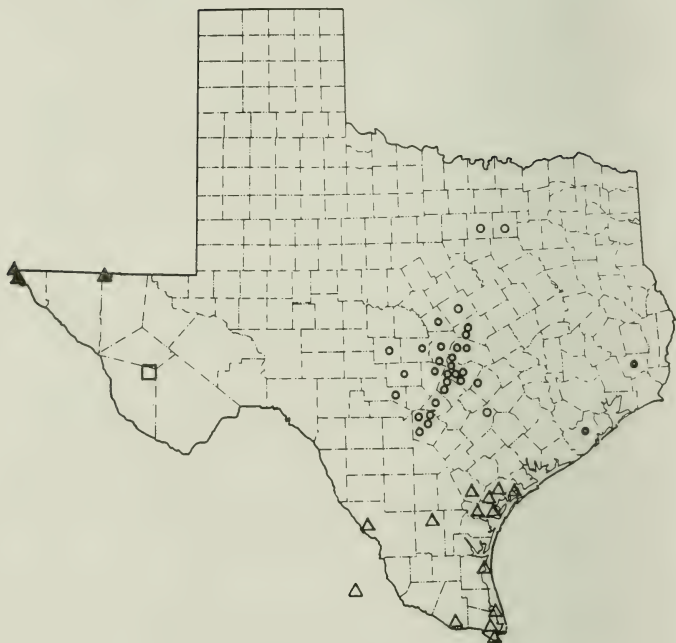


Figure 5. Distribution of *Centaurium* species in Texas: *C. multicaule* (open square); *C. nudicaule* (closed triangles); *C. parviflorum* (open triangles); *C. pulchellum* (closed circles); *C. texense* (open circles).

Table 1. Chromosome numbers of Texas species of *Centaurium*.

SPECIES	REFERENCE OR VOUCHER	NUMBER (2n)
<i>C. arizonicum</i>	TEX. Brewster Co.: Holt 24 (SRSC)	12 prs
<i>C. arizonicum</i>	MEX. Nuevo León: Broome 1978 (reported as <i>C. calycosum</i> var. <i>calycosum</i>)	42 prs
<i>C. beyrichii</i>	TEX. Bandera Co.: Broome 1978	41 prs
<i>C. calycosum</i>	TEX. Kerr Co.: Broome 1978	20 prs
<i>C. calycosum</i>	TEX. Bandera Co.: Broome 1978 (both reported as <i>C. calycosum</i> var. <i>nanum</i>)	20 prs
<i>C. maryannum</i>	N. MEX. Gypsum dunes: Ward 1984 (reported as <i>C. texense</i>)	21 prs
<i>C. multicaule</i>	MEX. Chihuahua: Powell 2487 (LL)	ca. 40 univalents
<i>C. nudicaule</i>	MEX. Nayarit: Broome 1978	21 prs
<i>C. pulchellum</i>	Six or more counts from over a wide region (Index to plant chromosome numbers, 1959-89)	7, 9, 18, 19 27 prs
<i>C. texense</i>	TEX. Bandera Co.: Broome 1978	21 prs

is readily referable to *C. multicaule*, several collections of which are known to occur in closely adjacent Chihuahua, México (e.g., Powell *et al.* 2487, LL).

Centaurium nudicaule (Engelm.) B.L. Rob., Proc. Amer. Acad. Arts 45:397. 1910. BASIONYM: *Erythraea nudicaulis* Engelm., Proc. Amer. Acad. Arts 17:222. 1882. TYPE: UNITED STATES. Arizona: Base of Santa Catalina Mts., Apr 1881, Pringle 154 (HOLOTYPE: GH).

This mostly Mexican species was reported from the U.S.A. by Broome (1974). She cited only three collections, all from southern Arizona. Since her work additional collections from the U.S.A. have been made in New Mexico (Doña Ana Co.: near the TEX-NM state line, E side of Mountains S of O'Hara Rd., 4600 ft, limestone slope, 26 Apr 1981, Worthington 7007 (NMC,TEX), and in Texas (Hudspeth Co.: Guadalupe Mts. Nat'l. Park, base of S. Stagecoach Hill, ca. 3950 ft, coarse alluvial deposits along wash on S side of gypsum outcrop, 17 Apr 1975, Burgess 3146 (LL,SRSC).

Because of the proximity of the Doña Ana County collection to the Texas border, *Centaurium nudicaule* is likely to be found in El Paso County. The species is readily distinguished by its relatively large ovoid capsules borne upon elongate pedicels, and by its relatively short styles which are terminated by disproportionately large flabellate stigmatic regions.

Centaurium pulchellum (Sw.) Druce, *Fl. Berks.* 342. 1898. BASIONYM: *Gentiana pulchella* Sw.

This small-flowered, mostly European, weedy taxon is known to Texas by at least two collections (Hardin Co.: *Correll & Correll 38794*, LL; and Brazoria Co., *Fleetwood 9249*, TEX), both perhaps recent introductions into the state.

Centaurium texense (Griseb. ex Hook.) Fern., *Rhodora* 10:54. 1908. BASIONYM: *Erythraea texensis* Griseb. ex Hook, *Gen. & Sp. Gent.* 139. 1839. TYPE: UNITED STATES. Texas: Austin Co., San Felipe, 1834, *Drummond 231* (HOLOTYPE: K; Isotype: GH!). It should be noted here that Fernald, in his transfer of *Erythraea texensis*, apparently erred in citing the original publication of the basionym, giving its source as *E. texensis* Griseb. ex Hook., *Fl. Bor. Amer.* 2:58. 1838. Consultation of the latter will show that the name *E. texensis* is nowhere to be found in the text.

The type of *Centaurium texensis* is said to be from San Felipe, Texas, which is in present day Austin County. As can be seen from Figure 1, *C. texense* is mostly confined to limestone soils of the Edwards Plateau Region of Texas and northwards, thus the type is anomalous in occurring in an isolated region of mostly sandy soils. According to Geiser (1948), Drummond is not known to have traveled as far west as the Edwards Plateau, but he did collect in Gonzales County, ca. 100 miles west of San Felipe, and it is possible that he collected type material in this vicinity. Regardless, the materials which I examined are unmistakably the same as material along the eastern portions of the Edwards Plateau.

Broome (1973, p. 114) notes that *Centaurium calycosum* var. *nanum* "is doubtfully distinct from *C. texense*", although she maintained both taxa, not having had the opportunity "to study first-hand in the field" the Texas taxa (p. 138). Because of its small corollas, *Centaurium breviflorum* might be mistaken for small-flowered forms of *C. calycosum*, which have been referred to as *C. calycosum* var. *nanum*. The latter are readily distinguished from *C. breviflorum* by their larger broader corolla lobes (mostly 6-7 mm long vs. 5-6 mm) and larger anther sacs.

ACKNOWLEDGMENTS

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CORRECTIONS AND ADDITIONS

Volume 74, number 2, page 72, due to a printer's error, the map was printed upside down.

Volume 74, number 3, cover, line 2 of last title, substitute "arranged" for "arranges".

Volume 74, number 4, due to a printer's error, page 348 was left blank. The text that should have appeared on that page was printed on page 184 of volume 75, number 2.

Volume 75, number 2, correcting an editorial error, the running head, pages 171, 173, and 175, should read "*Tillandsia* species transferred from *Vriesea*".

Volume 75, number 2, page 178, line 1 of the abstract and line 1 of the text should cite "*Chamaesyce* Gray" for S.F. Gray, rather than "*Chamaesyce* A. Gray" for Asa Gray. The error was the result of an editorial change, not the fault of the author.

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